EFFECT OF ENVIRONMENTAL AUDITS ON FINANCIAL PERFORMANCE OF OIL AND GAS FIRMS IN NIGERIA

EFEITO DAS AUDITORIAS AMBIENTAIS NO DESEMPENHO FINANCEIRO DE EMPRESAS DE PETRÓLEO E GÁS NA NIGÉRIA

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Abstract

The study examined environmental audit and oil and gas financial performance of oil and gas firms in Nigeria; data were collected from secondary source which covered 2013-2024 and analysed using descriptive, panel regression and inferential statistics. The results displayed profit after tax and environmental audit (EA) were insignificant coefficient (-0.2415) and p-value (0.0410) Also, environmental audit and return on Asset were positive having coefficient (0.2635) and p-value (0.0253). It is also shown that environmental audit and dividend per share displayed a significant with coefficient value (0.5212) and p-value (0.000). Also, environmental audit (EA) and earnings per share showed co-efficient value (0.5397) and p-value (0.000). The study concluded that environmental audits displayed a significant impact on asset as well as dividend and retained earnings that investors could anticipate for each share. The study recommended that government should provide enable environment for firm sustainability, more rules and regulations should be provided in ensuring periodic environmental audit by various firms operating in Nigeria, and management should implement an effective environmental management system to avoid additional environmental costs resulting from environmental damage in order to stop decline in profit after tax.

Keywords: Environment. Verification. Independent and Sustainability Reporting. JEL Classification: Environmental Accounting. Equity and Population Growth.

Resumo

O estudo examinou a auditoria ambiental e o desempenho financeiro de empresas de petróleo e gás na Nigéria; os dados foram coletados de fontes secundárias, abrangendo o período de 2013 a 2024, e analisados por meio de estatísticas descritivas, de regressão em painel e inferenciais. Os resultados mostraram que o lucro após impostos e a auditoria ambiental (AE) apresentaram coeficiente insignificante (-0,2415) e valor-p (0,0410). Além disso, a auditoria ambiental e o retorno sobre o ativo foram positivos, com coeficiente (0,2635) e valor-p (0,0253). Também foi demonstrado que a auditoria ambiental e o dividendo por ação apresentaram um valor significativo com coeficiente (0,5212) e valor-p (0,000). Além disso, a auditoria ambiental (AE) e o lucro por ação apresentaram valor de coeficiente (0,5397) e valor-p (0,000). O estudo concluiu que as auditorias ambientais apresentaram um impacto significativo nos ativos, bem como nos dividendos e lucros retidos que os investidores poderiam esperar para cada ação. O estudo recomendou que o governo forneça um ambiente propício para a sustentabilidade das empresas, que mais regras e regulamentos sejam fornecidos para garantir auditorias ambientais periódicas por diversas empresas que operam na Nigéria, e que a administração implemente um sistema de gestão ambiental eficaz para evitar custos ambientais adicionais resultantes de danos ambientais, a fim de interromper o declínio do lucro após impostos.

Palavras-chave: Meio Ambiente. Verificação. Relatórios independentes e de sustentabilidade. Classificação JEL: Contabilidade Ambiental. Patrimônio Líquido e Crescimento Populacional.

1 INTRODUCTION

Erinoso and Oyedokun (2022) said that environmental audit serves as essential ingredient used to formulate environmental policies and improve financial performance and profitability at any given period. Chinedu *et al*. (2020) said that auditor independence played significant roles in assessing environmental audit on financial performance of firms which provides true position of firms at a given period.

Egedegu *et al*. (2024) disclosed that firms should periodically carried out environmental audit on rules and regulations laid down which served proper method of

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increasing financial performance; it was also said that more resources should be allocated to reduce fossil fuels and improve financial sustainability of firm at any period of time. Afolabi *et al*. (2022) said that Nigeria exchange group emphasized inclusion of audit attributes on environmental audit as a mandatory for every listed firm in Nigeria.

The environmental audit and social sustainability of healthcare in Nigeria displayed insignificant relationship as various activities were carried out (Okechukwu and Okeke-Muogbo, 2020). Saman (2019) said that negative relationship existed between environmental audit and firm value in Nigeria. Ponnu and Karthigeyan (2010) studied on environmental accounting in Malaysian and discovered insignificant between variables. Tafadzwa and Fortune (2019) discussed corporate sustainability and investment profitability; it was realized insignificant relationship. Ratri and Dewi (2017) discussed environmental audit and firm value; it brought positive relationship in solving management problems. Sawitri (2017) examined environmental audit on firm value and discovered an insignificant relationship. The current study was conducted because of inconclusive decisions arrived by various authors regarding environmental auditing and firm value.

Usman *et. al* (2013) disclosed that environmental auditing has been used to monitor environmental and sustainability development in various countries of the world which serves as a great advantage to many stakeholders in promoting transparency and flow of information in many societies. This provides necessarily requirements needed for the organization to fulfill managerial commitment, environmental practices, regulations and policies in the country. Adeniji (2008) stated that management of firms should emphasize more on environmental green issues in the annual report publishing with consideration of policy and objectives, relationship between firm and environment and regulatory compliance. Deegan and Unerman (2011) emphasized that many firms in Nigeria ignored environmental reporting at the end of a year because of self-centered on stakeholders' objectives.

1.1 Statement of problem

The assessment of environmental audit and financial performance encouraged global attention as an important aspect of effective management. This encouraged compliance with relevant regulatory framework and this motivated current study.

Moreover, since environmental audit encompasses sustainability impact which is a global concern that portray responsibility and transparency that can build strong firm reputation which will ultimately elevate financial performance over time.

As environmental audit was conducted by Erinoso and Oyedokun (2022) on profitability of firms in Nigeria, there is a need to assess current environmental audit on financial performance in Nigeria from 2013 to 2024 as this sector serves as main source of revenue generation in Nigeria with rate pump price increase tremendously. Chinedu *et al*. (2020) conducted study on audit control and firm's profitability in Nigeria within 2006-2016 prompted present study to obtain data from selected firms as listed in Nigerian Exchange Group within 2013-2024 with aim of extending uncovered period under Chinedu *et al*. (2020) and to consider its significant effect on current impact. Egedegu *et al*. (2024) assessed environmental accounting and financial performance of Conoil Plc in Nigeria and specifically focused on return on assets and profit after tax as proxies to financial performance; this prompted current study to move ahead to consider other proxies on dividend per share and earnings per share

1.2 Objective(s) of the study

The study examined environmental audits and financial performance of oil and gas firms in Nigeria with consideration of the following objectives;
   i.   examine Environmental Audit and Profit after tax.
   ii. evaluate Environmental Audit and Return on Assets.
   iii. predict Environmental Audit on Dividend per share.
   iv. investigate Environmental Audits and Earnings per share

1.3 Research questions

The following research questions were formed for this study;
   i.   what is effect of Environmental Audit on Profit after tax?
   ii. what is relationship between Environmental Audit and Return on Assets?
   iii. what is influence of Environmental Audit on Dividend per share?
   iv. what is impact between Environmental Audit and Earnings per share?

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1.4 Hypotheses of the study

The following made up hypotheses tested on the study:

H_1: Environmental Audit has no effect on Profit after tax

H_2: Environmental Audit has no influence on Return on Assets

H_3: Environmental Audit has no impact on Dividend per share

H_4: Environmental Audit has no control on Earnings per share

2 LITERATURE REVIEW

2.1 Conceptual review

2.1.1 Environmental audit

This is a process of determining compliance rate on environmental rules and regulations by various firms operated in the country through physical assessment by specialized personnel (Irwansyah, 2017). This discloses methods of assessing firms' opportunities and strength with aim of reducing threats and weaknesses in its immediate environment. Adeofun (2000) said that firms should careful consider environmental audit scope from its operation with aims of capturing it into corporate goals and missions such as audit objectives and regulatory audit

2.1.2 Financial performance

This is the process of determining operational and financial activities of a firm at a given period through revenue realization from cost incurred on an investment that can be used to determined new mission and vision of a firm (Solanke *et al*.,2024).

Alicia *et al*. (2020) discussed world environmental problems and possible means of safeguarding ecological systems should be the main goals of firms operating in a particular period; this strategy would improve the firm value of an organisation if adequately implemented in firms' strategy policy. Yongliang *et al*. (2020) discussed public concerns about environmental problems that led to the formation of environmental

regulations for listed firms in China and this would reduce the menace of ecological issues in the environment.

2.2 Measurement of financial performance

Firm performance is described as the improvement in a firm occasioned by efficient and effectiveness in the firm's operation in conjunction with effective organization management (Garg, 2015). Firm performance is used to assess the achievement of firms over a given period through various means (Arumona *et al*., 2020). Verma (2019) stated that firm performance is a means of actualizing firms' objectives by considering various environmental factors inherent in the operation of a firm. The assessment of productivity enabled firm to achieve its policies and visions that reflected in the firm performance (Okafor, 2018).

The business owners including other stakeholders are demanding more information from firms to provide reports that provides the overall performance of an organization on changes such as ozone depletion, global warming and diverse practices over world; and this serves as a reliable place where information can be gotten for the assessment of firms' value in the world (Emeka-Nwokeji & Osisioma, 2019). Firm performance shows prosperity of the business owners that serve as a responsibility of the management to maximize values of a firm that form major vision of a firm (Okafor, 2018). The firm performance shows success achieved in the operation of a firm which forms the major interest of stakeholders that will also be used for prediction (Oyedokun *et al*., 2019).

The creation of firms enabled wealth maximization to be pursued which serves as a means of increasing shareholder dividend through increase in investment return (Sucuahi & Cambarihan, 2016). Pumlee *et al*. (2015) Similarly, Agustia *et al*. (2019) emphasized that sustainability practices ensured effectiveness and efficiency in running a business where investors and shareholders were guaranteed investment purposes. Solomon (2020) emphasized that performance would increase whenever market value and assets increased tremendously in a particular period. Firm performance is a process of sustaining product differentiation in a competitive environment with a positive multiplier effect on firm value (Oyedokun *et al*., 2019).

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Arifiyanto (2016) explained that Tobin's Q was most useful instrument for measuring firm performance in a given period. Garg (2015) also stated that incremental value was used to measure effectiveness in an operation conducted by firms. This is used to measure firm performance that displays management performance in order to determine condition of investment opportunities and growth level of a firm.

2.2.1 Profit after Tax

This is total revenue after tax including other expenses deducted in a given period (Olasehinde *et al*., 2023, Babatude & Akinsanmi, 2021).

2.2.2 Return on Assets (ROA)

This is computed using total earnings generated over a period of time divided by assets generated (Damieibi, 2023).

2.2.3 Dividends Per Share (DPS)

This is monetary value given to shareholders after end of year's activities, and it is determined by dividing total dividend paid to shareholders by number of shares held by each shareholder (Erinoso and Oyedokun, 2022).

2.2.4 Earnings Per Share (EPS)

This is total earnings by a firm after tax divided by shareholders' shares held in the firm (Damieibi, 2023).

2.3 Theoretical review

2.3.1 The legitimacy theory

This was created in 1975 by Dowling and Pfeffer that stated legal methods of carrying out a business. It was developed to regulate business registration and operational activities for specific periods in order to ensure that they operate within norms of society in which they were situated. If corporate activities are assumed to fit inside a socially built system of norms and values, legitimacy theory is a great match. Stated differently, businesses need to adhere to certain social standards in order to be seen seriously by the community (Bassey, Effiok & Eton, 2013).

2.3.2 Stakeholders theory

Freeman (1984) developed stakeholder as any person or organisation that has an interest in the company because they may influence or be impacted by its operations, according to Freeman (1984). A stakeholder's identity may be determined by the veracity of their claims, which are supported by an exchange connection they have with the organisation. As a result, stakeholders comprise the public, local communities, management, suppliers, workers, investors, creditors, and consumers. According to notion of stakeholders, an organisation always reacts to demands and worries of significant stakeholders that ensure strategic disclosures.

2.4 Empirical review

Egedegu *et al*. (2024) examined environmental accounting on profitability of petroleum sector in Nigeria, and ex-post facto research design was used for secondary data collection. The inferential statistic was applied to analyse data collected; result disclosed that independent variables displayed an insignificant relationship dependent element.

Damieibi (2023) researched effect of environmental audit on profitability of oil and gas firms in Nigeria within 2012 to 2021; multiple regressions was used to analyse secondary data collected. The findings displayed positive relationship between variables.

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Erinoso and Oyedokun (2022) examined environmental audit and financial performance of listed oil sector in Nigeria within 2011 to 2020. The ex-post facto research design was used for data collection and analysed through panel regression. It was disclosed that environmental audit displayed a good relationship with profits after tax.

Arumona *et al*. (2022) investigated environmental audit and profitability of oil sector in Nigeria within 2010 to 2019, and secondary data collected were analysed through regression. The results displayed significant relationship among variables.

Chinedu *et al*. (2020) conducted study on audit quality and financial performance of oil sector in Nigeria within 2006-2016. The ordinary least square was applied to analyse secondary data collected. The findings revealed that attributes of audit quality and auditor's independence displayed significant influenced on profitability, and recommended that internal control, integrity and auditor's skill should be improved.

Marwa, Salhi, and Jaboui (2020) examined environmental auditing, voluntary disclosure and quality of environmental disclosure. The regression was applied to analyse secondary data collected and study showed that environmental information disclosure significantly related to earnings of the firms.

Karambu and Joseph (2016) carried out research on environmental disclosure and profitability in Kenya. The study used longitudinal secondary data to collect information with utilization of content analysis; more so, research design employed was causal relationship among variables with utilization of regression for the analysis. The outcome revealed significant effect on both variables and recommended continuous increase financial performance.

Okpala and Iredele (2019) examined corporate social and environmental practices on market value of firms in Nigeria. The simple sample technique was used to collect data with utilization of regression for the analysis and result disclosed a positive relationship. Saman (2019) examined environmental accounting disclosure and financial performance of oil firms in Nigeria within 2015-2017. Data were sourced through secondary and used multi regression analysis; it was discovered significant relationship existed between variables.

Arumona *et al*. (2020) examined environmental practices and financial performance of oil sector in Nigeria within 2010-2019. The data collected from secondary source were analysed through ordinary least square (OLS) regression method. The findings showed significant impact on both variables. Omaliko *et al*. (2020)

researched environmental disclosures and performance of non-financial firms in Nigeria. The study was conducted in agriculture, conglomerate, construction estate, consumer goods, health care, information technology, industrial goods, natural resources, oil and service sector. The regression was used to analyse secondary data collected and result displayed relationship.

Menike (2020) examined effect of environmental accounting on firm value in Colombo, and data were collected from twenty-six listed firms within 2012-2019 through secondary sources. The analysis was done through panel regression and discovered a significant impact on variables. Carandang and Ferrer (2020) discussed environmental disclosure and firm value with corporate governance as a moderating variable in Philippines within 2012-2016. The panel regression was used to analyse data collected and discovered a perfect dependence between variables. Okechukwu and Okeke-Muogbo (2020) researched sustainability disclosure on profitability of listed firms in Nigeria. The study discovered significant relationship between variables.

Fasua and Osifo (2020) examined environmental practices on corporate performance of listed firms; data were collected from annual reports of eighteen quoted firms in Nigerian exchange group with utilization of panel regression analysis. It was discovered a positive relationship existed among variables except earnings per share that displayed insignificant outcome and recommended that environmental agencies should be strengthened by government to ensure orderliness in the environment.

Alawode and Adegbie (2020) examined impact of environmental accounting on profitability of oil sectors in Nigeria. The study recommended that necessary laws must be set up in order to enjoy environmental and reporting benefits. Alicia *et al*. (2020) argued on sustainability and environmental practices on financial performance of listed firms in Nigeria; data obtained from secondary source were analysed through regression models.

Nguyen and Tran (2020) discussed environmental accounting and enterprises' cost of capital with utilization of 672 observations as samples from listed firms. Regression analysis was used and finalized that adequate environmental disclosure would enhance and reduce cost of cost capital. Yongliang *et al*.(2020) argued on environmental disclosure and firm value in China with the utilization various methods of data gathering; it was discovered that environmental disclosure significantly affected firm performance. Khanifah *et al*. (2020) examined impact of environmental accounting on firm value and

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mediated by reputation in Indonesia within 2015-2018. Partial least squares were used for analysis and discovered significant relationship existed between variables.

Soyemi *et al*. (2021) examined effects of environmental management on firm value in Nigeria and data were collected from secondary source within 2016-2018 and used ordinary least square regression for the analysis. The results displayed mixed effects among variables.

2.5 Gap in literature

Evidence from existing literature reviewed revealed that environmental audit was a well research concept. Scholars in developed countries as well as Nigeria had studied this concept and made varying submission regarding its significance, correlation and impact on firm performance.

Also, most studies conducted on environmental audit focused majorly on the manufacturing companies or specifically financial sector. Although choice of this sector is logical because they are assumed to have more activities that can impact environment more adversely than other sectors. This study however took a leap above this argument by exploring multinational firms. The justification for need to explore into this group of firms is because environmental audit is still within voluntary practice in Nigeria, and firms may decide whether to report its environmental activities or not. The multinational firms having their subsidiaries in other countries where environmental auditing is mandatory, have more obligation to environmental auditing than others which makes them a better prototype to determine viability of environmental auditing in Nigeria; and to determine reliability of empirical analysis conducted when more realistic group is studied.

3 RESEARCH METHOD

This study used casual and *ex-post facto* research designs in order to determine how an independent variable affected dependent variable in a given observation through help of a cause and effect relationship for purpose of predicting certain causes from present situation using existing data.

The data were obtained from secondary sources through published annual financial reports of oil sector as stated in Nigerian Exchange Group and covered a period of 2013 to 2024. The sample size was formed from MRS oil Plc., Eterna PLC., Total Plc, Conoil Plc, and Oando Plc.

The study constructed model to investigate relationship between environmental audit and financial performance of oil firms in Nigeria with underpinned stakeholder theory. This study adapted model stated by Adegbie *et al. (*2020) on environmental practices and share value of food and beverages sector in Nigeria. The model is stated thus:

$$PAT_t = \beta_o + \beta_1 EAA_{it} + \mu_{it} \qquad (1)$$

$$ROA_t = \beta_o + \beta_1 EAA_{it} + \mu_{it} \qquad (2)$$

$$DPS_t = \beta_o + \beta_1 EAA_{it} + \mu_{it} \qquad (3)$$

$$EPS_t = \beta_o + \beta_1 EAA_{it} + \mu_{it} \qquad (4)$$

where:

PAT = profit after tax,

ROA = return on assets,

DPS = dividend on share,

EPS = earnings per share,

EA = environmental audits,

β_1 represent the coefficients on environmental audit

β_o represents the constant

i = the selected breweries

t = the time frame in the study, and

μ = idiosyncratic shock or individual observation error term.

The analysis was carried out through descriptive, inferential statistics and panel regression on each of objectives.

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3.1 Measurement of variables

Table 1:

Measurement of variables

S/N	Variable	Description	Measurement	Reference
I	Environmental Audit	Determination on how Environmental management systems and equipment are performing	A scoring system, which ranges between 0 and 1. Score 1 - When the firm has ISO 4001 certifications; Score 0 – if there is no ISO 4001 certification which is the evidence of environmental audit.	(Solanke *et al*.,2024).
Ii	Profit after Tax	This is total revenue after tax and other expenses	The total revenue less other expenses	(Olasehinde *et al*.,2023, Babatude & Akinsanmi, 2021).
Iii	Return on Assets	This is total assets invested in the business	This is computed by dividing total earnings generated over a period of time by total assets generated	(Damieibi, 2023).
Iv	Dividends Per Share (DPS)	This is value given to each investor in a business after tax has been deducted	This is the monetary value given to shareholders after end of year's activities	(Erinoso and Oyedokun, 2022)
V	Earnings Per Share (EPS)	This is value given to investor based on shares invested in the business	This is total earnings by a firm after tax divided by shares held by shareholders	(Damieibi, 2023).

4 DATA ANALYSIS AND DISCUSSION OF FINDINGS

This session captured presentation, analysis and interpretation of data through descriptive inferential statistics, explanations and discussion of implication from findings.

4.1 Data presentation

The data were analysed using descriptive statistics, skewedness and kurtosis as presented in appendix I

4.2 Descriptive statistics

The Table 4.1 considered minimum, maximum, mean, standard deviation, coefficient of variation, sum, skewedness and kurtosis variables used in this study. The profit after tax (PAT) displayed a mean value (6.29) with standard deviation (0.998) which disclosed that profit after tax across sampled oil and gas firms varied from one another as standard deviation value was far from mean. This was further established by coefficient of variation of 16 percent and total sum of Profit after tax (PAT) for listed oil and gas firms was 452.95. The negative skewedness and normal kurtosis value displayed -0.137 and 2.77 respectively indicating that data obtained were normally distributed.

The Table 4.1 showed returns on assets (ROA) with mean value (0.025) and standard deviation (0.050) which was highly varied from one another. This was further established by coefficient of variation (1.952), a minimum value (-0.101), a maximum (0.101), total sum (1.830), skewedness (-0.881) and abnormal kurtosis (3.642).

The Dividend per share (DPS) displayed a mean value (5.968), standard deviation (8.697), and coefficient of variation (1.457), a minimum (0), a maximum (26.450), total sum (429.683), skewedness (1.293) and normal kurtosis value (3.209). Likewise on Table 4.1, Earnings per share (EPS) showed a mean value (13.755), standard deviation (29.522), coefficient of variation of (2.146), a minimum (-21.500), a maximum (96.630), total sum (990.330), skewedness (1.803) and normal kurtosis value (5.447).

Lastly from Table 2, Environmental audit (ENVAD) has a mean value (0.431), standard deviation (0.499), coefficient of variation (1.158), a minimum (0), maximum (1), total sum (31), skewedness (-0.280) and kurtosis (1.079) showed variable data were normally distributed.

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Table 2.

Descriptive Statistics

Stats	LOGPAT	ROA	DPS	EPS	ENV. AUD
Mean	6.291	0.025	5.968	13.755	0.431
SD	0.998	0.050	8.697	29.522	0.499
Cv	0.159	1.952	1.457	2.146	1.158
Min	4.128	-0.101	0.000	-21.500	0.000
Max	8.343	0.101	26.450	97.630	1.000
Sum	452.949	1.830	429.683	990.330	31.000
Skewness	-0.137	-0.881	1.293	1.806	0.280
Kurtosis	2.773	3.642	3.209	5.447	1.079

Source: Researcher's Computation (2025)

4.3 Test of variables

4.3.1 Correlation matrix of dependent and independent variables

The Table 3 showed relationship between environmental audit and financial performance as proxied profit after tax (PAT) with negative coefficient (-0.2415) and p-value (0.0410). Furthermore, returns on assets (ROA) and environmental audit (ENV.AD) showed a positive relationship with coefficient value (0.2635) and p-value (0.0253).

The relationship between dividend per share (DPS) and environmental audit (ENV.AD) displayed a positive relationship with coefficient value (0.5212) and p-value (0.000). Also, earnings per share (EPS) and environmental audit (ENV.AD) displayed a positive relationship with coefficient value (0.5397) and p-value (0.000). It was equally observed that relationship between variables were too strong to cause multi-collinearity as none of them was above 0.70.

Table 3:

Correlation Analysis

Study Variables	LOGPAT	ROA	DPS	EPS	Env. Aud.
LOGPAT	1.000 ----				
ROA	-0.154 0.198	1.000 ----			
DPS	-0.170 (0.152)	0.206 (0.803)	1.000 ----		

EPS	-0.2805* (0.017)	0.4240* (0.000)	0.5987* (0.000)	1.000 ----	
Env. Aud.	-0.2415* (0.0410)	0.2635* (0.0253)	0.5212* (0.000)	0.5397* (0.000)	1.000 ----

Source: Researcher's Computation (2025)

4.4 Multi-collinearity test

The Table 4 displayed that VIF values for all variables were less than 0.10 while tolerance values for variables were greater than 0.10. The regression co-efficient was used to predict level of independent on dependent variables where result of the findings could be considered valid.

Table 4:

Tolerance and VIF Value

Variable	VIF	1/VIF
Environmental Audit	1.000	1.000
Mean VIF	1.000	

Source: Researchers' Computation (2025)

4.5 Heteroskedasticity and auto-correlation test

The test carried out to confirm authenticity of homoscedasticity assumption where residual variance was constant. In the table 4.4, the result displayed relationship between profit after tax and environmental audit as stated in the probability value (0.2195) that was greater than expected threshold of 0.05 where error term was constant across residuals.

The cross-sectional dependence test was presented in table 5 and showed insignificant relationship for model 1 and model 4 with probability values (0.0023) and 0.0276 respectively. Therefore, profit after tax and earnings per share under fixed effect condition displayed no correlation so standard error (PSCE) was used to correct observed statistical problem. The Hausman test displayed no relationship with p-value (0.05) among variables except dividend per share while random effect was significant at P-value (0.0000).

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Table 5:

Heteroskedasticity and Auto-Correlation Test

Breusch-Pagan / Cook-Weisberg test for Heteroscedasticity	PAT	ROA	DPS	EPS
Null Hypothesis	Chi2 Sta.	Chi2 Sta	Chi2 Stat	Chi2 Stat
Constant variance on residual variables (P>0.05)	1.51 (0.2195)	4.41 (0.0357)	10.98 (0.009)	39.92 (0.000)
Wooldridge test for autocorrelation				
Null Hypothesis	F-Stat.	F-Stat.	F-Stat.	F-Stat.
Non-first-order aut-ocorrelation (P>0.05)	39.940 (0.0015)	0.559 (0.4885)	23.925 (0.0045)	7.667 (0.0394)
Cross-sectional independent Pesaran's test				
Null Hypothesis	F-Stat.	F-Stat.	F-Stat.	F-Stat.
Non-dependence cross-sectional (P>0.05)	3.042 (0.0023)	0.648 (0.5172)	-0.026 (1.0207)	2.204 (0.0276)
Hausman Test				
Null Hypothesis	Chi2	Chi2	Chi2	Chi2
Co-efficients Difference (non-systematic, P>0.05)	0.24 (0.6215)	0.19 (0.6639)	32.32 (0.0000)	3.71 (0.0542)
Random effects				
Null Hypothesis	Chi2 Statistics (P-value)	Chi2 Statistics (P-value)	Chi2 Statistics (P-value)	Chi2 Statistics (P-value)
Co-efficients Difference (non-systematic, P>0.05)	211.63 (0.0000)	7.48 (0.0031)	- -	7.63 (0.0029)

Source: Researchers' Computation (2025)

4.6 The discussion of regression results

The Table 4.5 displayed result in the regression analysis that contained Wald chi2 (4.46) and probability (0.0347) at 5% significant level. The R-Squared (0.0583) assisted independent variables to provide more information on dependent variables. The results showed that a return on assets (0.0184) was significant at R-Squared (0.0694). The dividend per share calculated in the Table 4.5 showed Wald chi2 (14.73) and probability (0.0001) as displayed significant relationship among variables at R-Squared (0.2043). The earnings per share disclosed Wald chi2 (0.1171), probability (0.0006), R-Squared (0.3627) and significant at 5%.

The results disclosed that environmental audit (Env. Aud) contained a coefficient (-0.484), Z-statistics (-2.110) and p-value (0.035). This showed that environmental audit insignificantly affected profit after tax as specified in the ISO 4001 and positively affected returns on assets with a co-efficient (0.026), z statistics (2.360) and P-value *0.018).

The implication disclosed that highly regulated firms such as oil and gas could avoid large fines and uncover underutilised, environmentally harmful assets by using audit results to ensure compliance and improve returns on assets. The dividend per share (DPS) as displayed coefficient value (7.038), z-statistics (3.840) and p-value (0.000). This suggested that environmental audits captured more shareholders with ecological matters that ensured accountability, transparency, sound corporate governance and retained more investors.

Lastly from table 6, earnings per share (EPS) showed a coefficient (27.213), z statistics (3.420) and P-value (0.001). This disclosed that environmental audit ensured more profits, enhancing shareholder returns and increasing earnings per share. This could only be available when firms adopted implementation of operational and environmental modifications in the long run increased earnings per share over time.

The study aligned with Damieibi (2023) which conducted research on environmental audit and profitability of firms as established a positive relationship existed between variables. It was noted from Arumona *et al*. (2022) that environmental audit significantly affected financial performance of listed firms in Nigeria. However, the result negates the findings of Ali *et al*, (2023) which assessed impact of environmental accounting and financial performance. It was finalized that restoration costs, health, safety and environmental expenses displayed an insignificant relationship with return on assets.

Table 6:

Regression Results

Equation	Obs	R-Squared	Wald Chi2	P-Value
LOGPAT	72	0.0583	4.46	0.0347
ROA	72	0.0694	5.56	0.0184
DPS	72	0.2043	14.73	0.0001
EPS	72	0.3627	11.71	0.0006
(Indep-corrected)				
LOGPAT	Coef.	Std. Err.	z	P>z
Environmental Audit	-0.484	0.229	-2.110	0.035

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_cons	6.499	0.150	43.250	0.000
		(Het-corrected)		
ROA	Coef.	Std. Err.	t	P>t
Environmental Audit	0.026	0.011	2.360	0.018
_cons	0.014	0.008	1.810	0.070
		(Het-corrected)		
DPS	Coef.	Std. Err.	t	P>t
Environmental Audit	7.038	1.834	3.840	0.000
_cons	3.698	0.788	4.690	0.000
		(Panel-corrected)		
EPS	Coef.	Std. Err.	t	P>t
Environmental Audit	27.213	7.952	3.420	0.001
_cons	13.324	8.695	1.530	0.125

Source: Researchers' Computation (2025)

5 SUMMARY, CONCLUSION AND RECOMMENDATION

This section presented summary, conclusion, recommendations, contribution to knowledge and suggestions for further study.

5.1 Summary

The study captured global attention as an important part of effective environmental management. The role of environmental audit in helping management compliance with relevant regulatory framework of business motivated current study. Moreover, since environmental audit encompasses sustainability impact which is a global concern, it could be said that environmental audit of a firm portray responsibility and transparency that can build strong firm reputation which will ultimately elevate financial performance over time. Thus, the study specifically focused on environmental audit and financial performance of listed firms in Nigeria; further considered each objective on assets' return, dividend per share and earnings per share of oil and gas firms in Nigeria.

The literature captured conceptual, theoretical and empirical reviews that were hinged on legitimacy theory. The methodology contained data sources, populations, sampling techniques, variables' measurement, model specification and analysis techniques.

5.2 Conclusion

It was realised that environmental audit significantly affected financial performance that was reflected in the study's findings. The study therefore concluded that environmental audits positively impacted on profit realisation as well as dividend and retained earnings sustained from operation.

5.3 Recommendations

The study recommended that;

i.   management should implement an effective environmental management in order to avoid environmental costs, damage and decline in profit after tax.

ii. staff should comply with essential environmental sanitation and related standards so as to save costs and increase profits from asset utilisation.

iii. firms should consistently give stakeholders a reasonable level of assurance in order to match interest in dividend policies with long-term sustainability objectives that ensured higher dividend per share.

iv. more support should be given to environmental auditing as offered enterprises more confidence that ensured sustainable operations and consistent earnings.

5.4 Contribution to Knowledge

The result exposed various outcomes on environmental auditing that could ensure diverse measures of financial performance among listed oil and gas firms in the world and more beneficial to investors. Moreover, it was a great use to academic community because it provided a basis for comparison with studies conducted in other sectors of economy and environmental auditing.

5.5 Suggestions for further study

This study was limited to only oil and gas firm and further studies could be carried out to expand scope by considering other environmental sensitive sectors which may give

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a larger sample size. Also, characteristics of firms could be used to control environmental auditing to amplify impact on financial performance.

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APPENDICES

Appendix I - Data Collection

YEAR	PANEL ID	COMPANIES	SECTOR	Environmental audit	Dividend Pers share	Profit after tax	LOG PAT	Returns on Asset	Earnings per share
2013	1	Conoil	Oil and gas	0.00	4.00	3070091.00	6.49	0.04	4.42
2014	1	Conoil	Oil and gas	0.00	1.00	834421.00	5.92	0.01	1.20
2015	1	Conoil	Oil and gas	0.00	3.00	2307557.00	6.36	1.23	3.33

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Year	No.	Company	Sector						
2016	1	Conoil	Oil and gas	0.00	3.100	2837884.00	6.45	0.02	4.09
2017	1	Conoil	Oil and gas	0.00	2.000	1578507.00	6.20	0.03	2.27
2018	1	Conoil	Oil and gas	0.00	2.000	1796042.00	6.25	0.03	2.59
2019	1	Conoil	Oil and gas	0.00	2.000	1972322.00	6.29	0.03	2.84
2020	1	Conoil	Oil and gas	0.00	1.500	1440185.00	6.16	0.03	2.08
2021	1	Conoil	Oil and gas	0.00	2.500	3082690.00	6.49	0.06	4.44
2022	1	Conoil	Oil and gas	0.00	2.500	4957726.00	6.70	0.08	7.14
2023	1	Conoil	Oil and gas	0.00	2.500	9868239.00	6.99	0.10	14.22
2024	1	Conoil	Oil and gas	0.00	3.500	8773534.00	6.94	0.08	12.64
2013	2	Eternal oil	Oil and gas	0.00	0.00	703196.00	5.85	0.04	0.54
2014	2	Eternal oil	Oil and gas	1.00	0.00	1289565.00	6.11	0.07	0.99
2015	2	Eternal oil	Oil and gas	1.00	0.00	1278073.00	6.11	0.04	0.98
2016	2	Eternal oil	Oil and gas	1.00	0.25	1477559.00	6.17	0.05	1.13
2017	2	Eternal oil	Oil and gas	0.00	0.30	2001902.00	6.30	0.04	1.54
2018	2	Eternal oil	Oil and gas	0.00	0.400	1008996.00	6.00	0.02	0.77
2019	2	Eternal oil	Oil and gas	0.00	0.250	-144289.00	5.16	-0.01	-0.11
2020	2	Eternal oil	Oil and gas	0.00	0.000	941042.00	5.97	0.03	0.72
2021	2	Eternal oil	Oil and gas	0.00	0.000	-1100132.00	6.04	-0.02	-0.84
2022	2	Eternal oil	Oil and gas	0.00	0.000	1012252.00	6.01	0.02	0.78
2023	2	Eternal oil	Oil and gas	0.00	0.150	-9433112.00	6.97	-0.16	-7.23
2024	2	Eternal oil	Oil and gas	0.00	0.000	1348624.00	6.13	0.02	1.03
2013	3	MRS oil	Oil and gas	0.00	23.340	634418.00	5.80	0.01	2.50
2014	3	MRS oil	Oil and gas	0.00	74.930	746404.00	5.87	0.01	2.94
2015	3	MRS oil	Oil and gas	0.00	0.880	935625.00	5.97	0.01	3.68
2016	3	MRS oil	Oil and gas	0.00	1.100	1465905.00	6.17	0.02	5.77
2017	3	MRS oil	Oil and gas	0.00	1.730	1385056.00	6.14	0.06	4.54
2018	3	MRS oil	Oil and gas	0.00	0.000	-1264941.00	6.10	-0.06	-4.15
2019	3	MRS oil	Oil and gas	0.00	0.000	-1613082.00	6.21	-0.04	-5.29
2020	3	MRS oil	Oil and gas	0.00	0.000	-2264145.00	6.35	-0.06	-7.43
2021	3	MRS oil	Oil and gas	1.00	0.000	14848.00	4.17	0.00	1.12
2022	3	MRS oil	Oil and gas	1.00	0.000	-1104244.00	6.04	-0.03	3.84
2023	3	MRS oil	Oil and gas	1.00	0.000	4048758.00	6.61	0.07	11.81
2024	3	MRS oil	Oil and gas	1.00	0.000	6496917.00	6.81	0.06	18.95
2013	4	Oando plc	Oil and gas	0.00	0.000	1396926.00	6.15	0.00	0.23
2014	4	Oando plc	Oil and gas	0.00	0.000	-182893186.00	8.26	-0.21	-20.76
2015	4	Oando plc	Oil and gas	0.00	0.000	-50434843.00	7.70	-0.05	-42.20
2016	4	Oando plc	Oil and gas	0.00	0.000	3124803.00	6.49	0.00	-21.50
2017	4	Oando plc	Oil and gas	1.00	0.000	13941744.00	7.14	0.01	1.13
2018	4	Oando plc	Oil and gas	1.00	0.000	24432941.00	7.39	0.02	1.97
2019	4	Oando plc	Oil and gas	0.00	0.000	-207078294.00	8.32	-0.22	-0.14
2020	4	Oando plc	Oil and gas	0.00	0.000	-140674463.00	8.15	-0.10	-0.10
2021	4	Oando plc	Oil and gas	0.00	0.000	32858799.00	7.52	0.03	0.03
2022	4	Oando plc	Oil and gas	0.00	0.000	81230816.00	7.91	0.06	-0.06
2023	4	Oando plc	Oil and gas	0.00	0.000	60277168.00	7.78	0.02	-0.05

2024	4	Oando plc	Oil and gas	0.00	0.000	220120053.00	8.34	0.03	-0.18
2013	5	Seplat Oil Plc	Oil and gas	0.00	0.000	85431.00	4.93	0.42	2.13
2014	5	Seplat Oil Plc	Oil and gas	0.00	#REF!	40481.00	4.61	0.09	0.79
2015	5	Seplat Oil Plc	Oil and gas	1.00	17.560	13418.00	4.13	0.02	23.94
2016	5	Seplat Oil Plc	Oil and gas	1.00	9.130	-44921.00	4.65	-0.07	-79.73
2017	5	Seplat Oil Plc	Oil and gas	1.00	0.000	81111.00	4.91	0.10	143.96
2018	5	Seplat Oil Plc	Oil and gas	1.00	15.350	44867.00	4.65	0.06	79.04
2019	5	Seplat Oil Plc	Oil and gas	1.00	15.350	85016.00	4.93	0.08	149.35
2020	5	Seplat Oil Plc	Oil and gas	1.00	19.000	-30712.00	4.49	-0.02	-46.42
2021	5	Seplat Oil Plc	Oil and gas	1.00	10.300	46931.00	4.67	0.04	97.63
2022	5	Seplat Oil Plc	Oil and gas	1.00	11.180	44433.00	4.65	0.03	45
2023	5	Seplat Oil Plc	Oil and gas	1.00	26.45	81330.00	4.91	0.03	92.75
2024	5	Seplat Oil Plc	Oil and gas	1.00	55.27	214247.00	5.33	0.02	385.61
2013	6	Total Oil Plc	Oil and gas	1.00	9.000	5334091.00	6.73	0.07	15.71
2014	6	Total Oil Plc	Oil and gas	1.00	9.000	4423733.00	6.65	0.05	13.03
2015	6	Total Oil Plc	Oil and gas	1.00	14.000	4047051.00	6.61	0.05	11.92
2016	6	Total Oil Plc	Oil and gas	1.00	17.000	14797095.00	7.17	0.11	43.58
2017	6	Total Oil Plc	Oil and gas	1.00	17.000	8019298.00	6.90	0.07	23.62
2018	6	Total Oil Plc	Oil and gas	1.00	17.000	7960893.00	6.90	0.06	23.45
2019	6	Total Oil Plc	Oil and gas	1.00	6.71	2278979.00	6.36	0.02	6.71
2020	6	Total Oil Plc	Oil and gas	1.00	6.08	2063385.00	6.31	0.01	6.08
2021	6	Total Oil Plc	Oil and gas	1.00	22.2	16862130.00	7.23	0.08	49.66
2022	6	Total Oil Plc	Oil and gas	1.00	25	16118376.00	7.21	0.05	47.47
2023	6	Total Oil Plc	Oil and gas	1.00	25.000	12912544.00	7.11	0.03	38.03
2024	6	Total Oil Plc	Oil and gas	1.00	40.000	27496279.00	7.44	0.06	80.99

Appendix II - Analysis Results

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```
                    LOGPAT      ROA       DPS      EPS Enviro~t
        ─────────────┼──────────────────────────────────────────
        LOGPAT │    1.0000

                         72

           ROA │   -0.1535   1.0000
                   0.1981
                        72        72

           DPS │   -0.1704   0.2056   1.0000
                   0.1524   0.0832
                        72        72        72

           EPS │   -0.2805*  0.4240*  0.5987*  1.0000
                   0.0170   0.0002   0.0000
                        72        72        72        72

    Environmen~t │  -0.2415*  0.2635*  0.5212*  0.5397*  1.0000
                   0.0410   0.0253   0.0000   0.0000
                        72        72        72        72        72


        Variable │     VIF       1/VIF
        ─────────────┼──────────────────
    Environmen~t │    1.00    1.000000

        Mean VIF │    1.00
```

Source	SS	df	MS			
				Number of obs	=	72
				F(1, 70)	=	4.33
Model	4.12721724	1	4.12721724	Prob > F	=	0.0410
Residual	66.6586798	70	.952266854	R-squared	=	0.0583
				Adj R-squared	=	0.0449
Total	70.785897	71	.996984465	Root MSE	=	.97584

LOGPAT	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
Environmen~t	-.4835286	.2322591	-2.08	0.041	-.9467548	-.0203023
_cons	6.499141	.1524009	42.65	0.000	6.195187	6.803095

. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
     Ho: Constant variance
     Variables: fitted values of LOGPAT

     chi2(1)   =   1.51
     Prob > chi2 =   0.2195

. xtserial LOGPAT Environmentalaudit

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
   F(1,   5) =   39.940
        Prob > F =   0.0015

. xtcsd, pesaran abs

Pesaran's test of cross sectional independence =   3.042, Pr = 0.0023

Average absolute value of the off-diagonal elements =   0.276

Pesaran's test of cross sectional independence =   3.042, Pr = 0.0023

Average absolute value of the off-diagonal elements =   0.276

. hausman fe re

	—— Coefficients ——			
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	fe	re	Difference	S.E.
Environmen~t	-.1201345	-.1347193	.0145849	.0295414

                 b = consistent under Ho and Ha; obtained from xtreg
       B = inconsistent under Ha, efficient under Ho; obtained from xtreg

   Test: Ho: difference in coefficients not systematic

          chi2(1) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                =   0.24
        Prob>chi2 =   0.6215

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```
Breusch and Pagan Lagrangian multiplier test for random effects

        LOGPAT[PANELID,t] = Xb + u[PANELID] + e[PANELID,t]

        Estimated results:
                                    Var      sd = sqrt(Var)
                        ──────────────────────────────────────
                LOGPAT │    .9969845        .9984911
                     e │    .2360793        .4858799
                     u │   1.006747        1.003368

        Test:    Var(u) = 0
                            chibar2(01) =    211.63
                          Prob > chibar2 =    0.0000
```

Source	SS	df	MS	Number of obs	=	72
				F(1, 70)	=	5.22
Model	.012122764	1	.012122764	Prob > F	=	0.0253
Residual	.162497505	70	.002321393	R-squared	=	0.0694
				Adj R-squared	=	0.0561
Total	.174620268	71	.00245944	Root MSE	=	.04818

ROA	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Environmenta~t	.0262056	.0114675	2.29	0.025	.0033345	.0490768
_cons	.0141268	.0075246	1.88	0.065	-.0008805	.0291341

```
. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
        Ho: Constant variance
        Variables: fitted values of ROA

        chi2(1)      =      4.41
        Prob > chi2  =    0.0357

. xtserial ROA Environmentalaudit

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
    F( 1,        5) =       0.559
          Prob > F =       0.4885


. xtcsd, pesaran abs

Pesaran's test of cross sectional independence =     0.648, Pr = 0.5172

Average absolute value of the off-diagonal elements =     0.279
```

```
                   ──── Coefficients ────
                    (b)          (B)           (b-B)      sqrt(diag(V_b-V_B))
                     fe           re         Difference          S.E.
    ──────────────────────────────────────────────────────────────────────────
    Environmen~t    .0182589    .0214078      -.0031488         .0072476
    ──────────────────────────────────────────────────────────────────────────

                     b = consistent under Ho and Ha; obtained from xtreg
           B = inconsistent under Ha, efficient under Ho; obtained from xtreg

      Test:  Ho:  difference in coefficients not systematic

                 chi2(1) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                         =            0.19
                Prob>chi2 =         0.6639

. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        ROA[PANELID,t] = Xb + u[PANELID] + e[PANELID,t]

        Estimated results:
                          │         Var       sd = sqrt(Var)
                 ─────────┼──────────────────────────────────
                      ROA │      .0024594         .0495927
                        e │      .0019688         .0443707
                        u │      .0005349         .0231278

        Test:   Var(u)  = 0
                         chibar2(01) =      7.48
                      Prob > chibar2 =    0.0031
```

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```
        Source │      SS           df       MS            Number of obs   =       72
───────────────┼──────────────────────────────────       F(1, 70)        =     26.10
         Model │  1458.5027         1    1458.5027        Prob > F        =    0.0000
      Residual │  3911.49465       70   55.878495         R-squared       =    0.2716
───────────────┼──────────────────────────────────       Adj R-squared   =    0.2612
         Total │  5369.99735       71   75.6337656        Root MSE        =    7.4752


───────────────┬──────────────────────────────────────────────────────────────────────
           DPS │    Coef.    Std. Err.      t     P>|t|     [95% Conf. Interval]
───────────────┼──────────────────────────────────────────────────────────────────────
 Environmenta~t │  9.089649   1.779163    5.11    0.000     5.541219    12.63808
         _cons │  2.054222   1.167429    1.76    0.083    -.274141    4.382586
───────────────┴──────────────────────────────────────────────────────────────────────


. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
        Ho: Constant variance
        Variables: fitted values of DPS

        chi2(1)      =     10.98
        Prob > chi2  =    0.0009

. xtserial DPS Environmentalaudit

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
    F( 1,      5) =     23.925
          Prob > F =      0.0045

.


Pesaran's test of cross sectional independence =    -0.026, Pr = 1.0207

Average absolute value of the off-diagonal elements =     0.265


                ──── Coefficients ────
                 (b)          (B)          (b-B)      sqrt(diag(V_b-V_B))
                 fe2          re2        Difference         S.E.
───────────────┼──────────────────────────────────────────────────────────────────────
 Environmen~t │ .8713012    6.730424     -5.859123       1.030536
───────────────┴──────────────────────────────────────────────────────────────────────

                  b = consistent under Ho and Ha; obtained from xtreg
          B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

            chi2(1) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                    =       32.32
         Prob>chi2 =      0.0000
```

```
      Source |       SS           df       MS            Number of obs   =        72
-------------+----------------------------------         F(1, 70)        =     28.76
       Model |  18021.3842         1   18021.3842        Prob > F        =    0.0000
    Residual |  43859.4956        70   626.564222        R-squared       =    0.2912
-------------+----------------------------------         Adj R-squared   =    0.2811
       Total |  61880.8798        71   871.561687        Root MSE        =    25.031
```

```
-------------------------------------------------------------------------------
         EPS |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+-----------------------------------------------------------------
Environmenta~t|   31.95123   5.957668     5.36   0.000     20.06903    43.83342
       _cons |  -.0021951   3.909227    -0.00   1.000    -7.798902    7.794512
-------------------------------------------------------------------------------
```

```
. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
        Ho: Constant variance
        Variables: fitted values of EPS

        chi2(1)      =     39.92
        Prob > chi2  =    0.0000

. xtserial EPS Environmentalaudit

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
    F(  1,       5) =      7.667
           Prob > F =      0.0394


. xtcsd, pesaran abs

Pesaran's test of cross sectional independence =     2.204, Pr = 0.0276

Average absolute value of the off-diagonal elements =      0.377
```

```
                ―――― Coefficients ――――
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |      fe3          re3         Difference          S.E.
-------------+-----------------------------------------------------------------
Environmen~t |   16.34525     23.21284       -6.867585         3.566663
-------------------------------------------------------------------------------
                       b = consistent under Ho and Ha; obtained from xtreg
          B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                 chi2(1) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                         =         3.71
                 Prob>chi2 =      0.0542
```

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Authors' Contribution

Both authors contributed equally to the development of this article.

Data availability

All datasets relevant to this study's findings are fully available within the article.

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