ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume X Issue XII December 2023

Impact of Environmental Cost on Financial Performance of Listed Industrial Goods Firms in Nigeria

Ahmed Tanimu Abdullahi, Prof. Muhammad Liman Muhammad

Department of Accounting, Bayero University Kano – Nigeria.

DOI: https://doi.org/10.51244/IJRSI.2023.1012006

Received: 07 November 2023; Accepted: 23 November 2023; Published: 28 December 2023

ABSTRACT

To fill the gap in the industrial goods sector of the Nigerian economy on the subject matter, this study investigates the impact of environmental cost on the financial performance of listed industrial goods firms in Nigeria. An explanatory research design was employed to collect panel data extracted from the annual reports and account of the 11 sampled listed firms, for a period of Ten (10) Years (2012 -2021). The regression results obtained from the study's models indicates that the firms' environmental cost (Community Development cost and administrative cost) affects their accounting-based financial performance (ROA) significantly and positively, and also affects the market-based financial performance indices (Tobin's Q) insignificantly and negatively. Thus, based on the study's findings it recommended that the management of the firms should employ effective and right balance investment on environmental cost components that will cater for all the stakeholders' interest.

Keywords: Environment Cost, Financial Performance, Industrial Goods, Stock Exchange Group

INTRODUCTION

In the last five decades, financial performance (FP) has gained increasing attention, with more prominence in the business world, as the firm continue to face complex and multifaceted issues in their business operations. It is a crucial aspect of sustainability, which both the firms' shareholders, stakeholders and potential investors are really concern about. This is most particular with the spiralling effect of globalization, accelerated pace of the fourth industrial revolution, technological advancement, and other interconnected environmental challenges that have brought fluxes to the global business space, which impact extend also to the corporate financial performance. Literatures have defined FP in several ways, but most of the studies described it based on cardinal points that includes, an evaluation mechanism in monetary terms, used to assess a firm's bottom lines and operational efficiency, corporate management performance, firm's sustainability and growth rate, and addressing the interest of all stakeholders with legitimate claims (Otley, 2016; and Franco-Santos et al.,2007). FP is viewed as the heart of an organization, that is not only used to evaluate a firm's policies and resource utilization, but also serve as an appraised tool of entity's financial health over the period of time (Naz, et al., 2016; and Al-Waeli, et al., 2020).

Firm financial performance (FP) been a term that is permanently embedded in accounting literature, it is mostly conceptualized and operationalized in accordance with the research purpose, scopes and frameworks, and the availability/nature of the used data. It is a vital tool use by the firms' relevant stakeholders to evaluate corporate overall financial health, compares key businesses performance indicators, rate management productivity, and determined value created on assets used over a given period (Kinyua Et al. 2015; Al-Waeli, et al., 2020; and Fatah & Hamad, 2022). An indicator of good financial performance could be deduced from the internal generated historical data (Al-Mawali, 2022). Thus, financial performance is measured by the aid of various measurements tools/variables (Kinyua, et al., 2015), which although some scholars adjudged it to be arbitrary, because of the perceived notion that it is highly subjective in the measurements of its variable's (Mishkin, 2007; Mokhtar & Ismail, 2012; Harash, et al, 2014; and Kenton,

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume X Issue XII December 2023

2022). The prominent measures of finance performance in empirical literatures comprises of proxies that includes returns on investment (ROI), returns on asset (ROA), returns of Equity (ROE), returns on capital employed (ROCE), Earning Yield (EY), and Tobin's Q (TQ). It is constructed in studies as either DV or IV, and any other named variable (mediator or moderator). Broadly, studies have categorised its measures into two groups, which are accounting-based measurements and market-based measurements (Kurawa and Shuaibu, 2022). Overall, some of the measures of FP are seen as endogenous and sometimes exogenous, but they all aid firms to evaluate the extent at which its assets are optimally utilized.

However, in view of the obvious fact that business does not operate or exist in a vacuum or closed system without the environment (Kurawa and Shuaibu, 2022), it thereby means environmental cost is a necessary and unavoidable cost that firms must incurred and managed effectively, as studies have shown that it influences businesses performance (Al-Waeli et al., 2020). Industrial environmental related challenges are ranked annually as part of the globally priority area of concern (WEF, 2023), which the business world was left with no choice but to respond to it positively. Environmental cost is a measure that is used to evaluate corporate sustainability practices, and to strategically address any environmental factor that could threatened their long-term financial success and public trust. Effective environmental costs management is evidently shown to influence corporate financial performance, most particularly in terms of risk management, regulatory compliance, and input-output cost. Corporate environment cost (EC) is perceived to comes as result of the interaction of firm economic activities with its operating environment, as such the higher the intensity of firm operations, the higher the environmental impact in terms of degradation, pollutions and waste disposal (Basuki & Irwanda, 2018; and Idris, 2012). EC is considered to be an evolving concept that emerged in the last twenty-five, specifically in the 1970's from Europe (Abd-Rajak, 2022). A good environmental cost management is viewed as prerequisite of sustainable development, and eco-efficiency (Pandey & Kumar, 2016; Basuki & Irwanada, 2018).

EC is proved to be a realistic business strategy model employed by firms to integrate corporate social responsibilities and sustainable business performance, and it significantly influence the socio-economic and political sphere of emerging and rapidly growing society (Pham, et al. 2021). It is therefore pertinent for firms in industrial sector whose activities are most closely related to the environment (Sief, 2014), to adopt integrated sustainable reporting, which is now recognised pathway to a more stable and resilient business world. Environmental cost is viewed as an integral business strategy that is committed to not only increases in profitability (corporate performance), but to a broader sustainable strategy that address more stakeholders (Idowu & Agboola, 2022). The most common firm's environmental cost measurement variables include waste product concentrations, emissions from normal business operations, donations, inadvertent emissions and indiscriminate disposal practices capable of contaminating the environment, and have negative health implication to both human and biological living organism.

In the light of the foregone, this study drawing on insights from studies (Sief, 2014; and Basuki & Irwanda, 2018) and the findings based on analysed data from empirical literatures (Okafor, 2018; Idowu & Agboola, 2022; and Oyedokun & Erinoso, 2022) it realised the serious challenges that the operation of industrial enterprises posed on the environment, and how significant this impact on the firms overall financial performance. Thus, this study in its resolved to improve on the finding of prior studies on the subject area, it used three stands point to differentiates it from other works. Firstly, based on cross-country noticed literature gap on the subject matter, and it observed that practically most of the players in the industrial goods sector of Nigeria economy invest little or insignificant amount of their resources in the management of environmental issues, as in a decade the whole firm in the sector were shown to invested little above Ten Billion Naira (N10.0B) on EC, in the form of donations and contribution, and CSR projects. This is despite the fact that virtually all the players in the industry engaged on business activities that have substantial environmental impact. Secondly, the paper employed a different methodological typology that allows it to examined the impact of the environmental cost, with the use of average EC variables. The relevance

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume X Issue XII December 2023

selected variables are similar to measures used by some prior studies (Idowu and Agboola, 2021; Oyedokun and Erinoso, 2022) that also examine some of the variable on individual basis. This study computes its EC variables on the basis of joint average value, and it was employed to examines its influence on the study's DV proxied by two separately categorised FP variables (Accounting-Based FP and the Market-based FP variables).

Thirdly, the study employed the postulates theories of stakeholders, legitimacy, signal and institutional to underpin the conducts of the study. The theories were selected based on the study's variables, which are although similar with prior studies in some instance (Ogbu et al., 2021; Ayu et al., 2020; Emmanuel, et al., 2019; and Zijl & Maroun, 2017). This study selected its theories on the premises that firms are part of community, therefore firm must pay significant attention to gain legitimacy from the community, by providing positive information and ensures that they create value for all its stakeholders not just only the shareholders. Also, corporate business relationship is expected to be carry out in accordance with societal boundaries and norms, so that the firm survival conforms with the society current beliefs and norms (Dewiyanti, 2021). Thus, this study will provide a new perspective on the impact of environmental cost on the financial performance of firms, and it conducted the rest of the paper as follows. In the next sub-section of the paper, it succinctly reviews relevant literature on the study's main variables, and states the hypothesis formulated for the study. Section two (2) presents the study's methodology, and in the third section it presents the study's results and discussions. In the fourth and fifth section it presents the study robustness test checks and it drawn it conclusions drawn from the findings made with a recommendation accordingly. Finally, the study posed below research question to aid it conducts;

To what extent does EC affect the financial performance of the listed Industrial goods firms in Nigeria?

CONCEPTUALIZATION

This study's conceptualization was premised on some selected broad categories of measures used in extent literatures (Zhang and Wellalege, 2022), to investigates the relationship between environmental cost variables and financial performance indices. On environmental cost (EC), Idowu and Agboola (2022) used business area cost, administrative cost, social cost, environmental remediation cost, and Research and development cost (R&D) to the firm's return on equity (ROE) on cross section random test, and found that environmental remediation cost and administrative cost has a positive effect, and Business location cost has a negative and highly significant effect, while the R&D Cost and Social Cost have no effect on the firms' financial performance respectively. Al-Mawali (2022) constructed 3 separates models that was measured by survey instrument developed on the basis of 19 environmental cost items, grouped into four main areas, which are prevention and environmental management, processing costs of non-product output, material purchase value of non-product output, and waste and emission treatment to examined financial performance (Net profit margin, ROA and ROE). He found that environmental cost usage to positively affects Financial Performance, and concludes that investing on environmental costs leads to better financial performance.

Moreso, on the financial performance variables that is the DV of this study, the measures also vary widely between existing literatures. This study investigates the two broad categories of its measures documented in prior empirical studies, basically from two sets of studies (first on Nigeria industries domain and those firms studied outside Nigeria). Firstly, on studies outside Nigeria, Pandey and Kumar (2016) found that there is no significant relationship between the firms' environmental expenditure and its financial performance. On the other hand, subsequent studies by Ayu et al., (2020) that measured financial performance by the used of (ROA) to environmental and social costs information, they found the firm financial performance to be significantly affected by the EC cost, and it is in agreement with theories of instrumental stakeholders, legitimacy and agency. Pharm, et al. 2021 that measured financial performance measured by earnings yield, return on asset, return on equity, return on capital employed, and with a market-based financial measure,

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume X Issue XII December 2023

Tobin's Q, they found positive relationship between corporate sustainability and the accounting based financial indices, but inconclusive results on the Tobin's Q. On the other hand, Abd-Rajak (2022) shows that on an individual basis green accounting has no effect on profitability. Similarly, Fatah and Hamad (2022) study measured financial performance by the use of ROA to investigate the impact of environmental cost variables (ERPC, ELCP and DCC) on FP, and it found that the 3 EC variables significantly impact on the firm's financial performance.

For studies in Nigeria, on accounting-based financial performance variables Okafor (2018) used ROA Financial Performance measures, and found that the 3 EC variables significantly affect the firm's performance (ROA). Onyekachi, et al. (2020) used earning per share, and found that investments on environmental associates significantly affect the firms' earnings per share. Oyedokun and Erinoso (2022) measured it using ROA, ROE and PAT, and found that the environmental variables studied had a significant effect on the financial performance of the listed oil and gas Firms. On the other hand, for the market-based measures of FP Chiamogu and Okoye (2020) measured it using Tobin's Q (TQ) to EC, and found that the studied EC variables had a positive significant effect on Tobin's. While studies that measured both FP measures, Kurawa & Shuaibu (2022) used the earning per Share (EPS) and Tobin's Q (TQ) measured as Net profit after tax divided by outstanding shares and Market value of shares divided by book value of shares respectively to investigates environmental disclosure, and found a positive significant relationship between the used 4 disclosure variables and EPS while negative with TQ of the studied firms. Thus, based on findings from the aforementioned studies, it clearly shows that environmental related cost/variable significantly affects the two broadly classified financial performance indices, but it influences the accounting-based indicators more significantly and positively than the market-based indices.

In the light of the foregone, based on the document empirical evidence and insight drawn from the postulates of theories like stakeholders, legitimacy, institutional and agency theories, this study posits the following null hypothesis to be tested in the subsequent sub-section;

$H0_1$: Environmental Cost does not have significant impact on the ROA of listed industrial good firms in Nigeria.

$H0_2$: Environmental cost does not have significant impact on the FTQ's of listed industrial good firms in Nigeria.

METHODOLOGY AND DATA

In examining the impact of environmental cost on the firm's financial performance, this study employed explanatory research design, with the aid of ex-post facto technique to sourced it relevant panel data, and was generated from the archived annual reports and accounts of the eleven (11) sampled listed industrial goods firm, for the period of Ten (10) years (2012 – 2021). The sample firms were drawn from a total population of the thirteen (13) listed firms on the floor of Nigeria exchange group, which was arrived at with the aid of two-point stands filtering mechanism used. It is required that; 1) the firms must be listed on or before the last decade (10 years' periods) covered by the study, and 2) the listed firms must have published its financial statements for the entire periods covered, with complete data needed for the study. The filtering mechanism used were consider very necessary, because in the first selection criterion, it enabled the study selects only firms that are listed on or before the 1st January 2012 and 31st December 2021, and in the second criterion, it enabled the study selects entities that has published all its financial statements within the stipulated periods. Thus, table 1 in appendix II presents the study's sampled population. The data generated from the sample firms were used as an analysis to examine the relationship between the study's main variables (DV and IV), and as well used to test the formulated hypotheses.

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume X Issue XII December 2023

2.1 Dependant Variables (DV)

This study employed Returns on Asset (ROA) and Tobin's Q as proxy for its two DV, that represents the each of the two most categorised financial performance variables, known as accounting-based ratio and market-based indicator respectively. For returns on assets abbreviated as ROA, the study used the firms yearly extracted net profit after tax divided by the firm's total assets for the period, and is adopted from Al-Mawali (2021) study. While for firms Tobin's Q abbreviated as FTQ, it was measured as the Firm's Market Capitalization divided by the Firm's Total Asset for the period, as used by Kurawa and Shuaibu (2022); and Chiamogu and Okoye (2020).

2.2 Independent Variables

The study adopts some of the objectively used reliable measures by literatures for environmental cost, that is comparable across firms in the different sectors. These measures were proxied by variables such as community development cost and firm administrative cost. It is a sum average of the variables used to examine its relationship with the study DV. For the community development cost, it modified the adopted one from Okafor (2018), and the measure is the firm's yearly total monetary donations and charitable contribution divided by the firm's total Assets in a period. On the other hand, for the firm administrative cost, it was a modified copy of adopted measure from Idowu & Agboola (2021) that used firms total administrative cost divided by the total asset for the period. The two individual computed variables were jointly summed and divided by two (2) to arrive at the firm EC for each period used.

2.3 Model Specifications

To examine the impact of environment cost variables measured on the listed industrial goods firm financial performance, this study applies a logit model in the understated form for the two of its constructed models. The model was adopted from empirical literature like Emeka and Okeke (2019).

$$ROA_{it} = \alpha_0 + \beta 1FEC_{it} + \beta 2LEV_{it} + \beta 3\, FSV_{it} + \beta 4\, AGE_{it} + \varepsilon_{it} \ldots. \quad (I)$$
$$FTQ_{it} = \alpha_0 + \beta 1FEC_{it} + \beta 2LEV_{it} + \beta 3\, FSV_{it} + \beta 4\, AGE_{it} + \varepsilon_{it} \ldots. \quad (II)$$

Where; the study's dependent variables proxy by ROA_{it} and FTQ_{it} stand for Returns on Asset of firm I in period t and FTQ stands for Firm Tobin's Q for firm i in period t respectively. The study's independent variable (IV) presented in the model is FEC, which stands for Firm's Environmental Cost for firm i in period t. On other hand, i denotes firms sampled (11); ? represent Constant Term of firm i in period t; ? stand for the Coefficient Term; and t is the study's time period (Ten years from 2012 – 2021); and e denotes the Error term. Moreso, in the models (I and II) equations, the study follows prior studies (Okeke, 2019; Kurawa & Shuaibu, 2018; and Zhang & Wellalage, 2022) to introduce control variables to control the presence of heterogeneity. It used the individual firm Size value denoted by FSV, and it is measured as the Natural Log of the firm's total asset in the period. Leverage represented by LEV in the equation, measured the firm's Total Interest-Bearing debt divided by total asset. It was employed to examine whether the extent of the firm relying more or less on either of the equity or external funding could affect their level of investment on environmental cost. The firm Age denoted by AGE in the model is measure as the age of the firm by incorporation at the respective period, and it was use to evaluate the extent at which Firms' age that come with experience and potential of evaluating business risk could influenced their investment decision on EC that can impact of their financial performance.

2.4 Study's Data

Summary statistics for the variables used in Models I and II were demonstrated in Table 1. From the data

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume X Issue XII December 2023

presented in the table, the firm's financial performance measured by Return on Asset (ROA) and Firm's Tobin's Q (FTQ) that has a mean value of 9.9% with a variation of 16.3% and mean of 239% and standard deviation of 351% respectively. It shows that the firms' stakeholders enjoy higher investment returns under the market-based as against the accounting-based financial performance indices, that mean for every N1 invested the market-based generates 351% investment returns.

Table 2 reports the Pearson correlation matrix for variables used in Models I and II. In the both models (I and II) the firm's ROA and FTQ are significantly and positively correlated with the firm environmental cost, at a co-efficient value of 0.880 and 0.055 respectively.

Table 2: Summary Statistics

sVariables	Observation	Mean	SD	Min	Max.	Skewness	Kurtosis
ROA	110	0. 099	0.163	-0.149	0.540	1.012	4.240
FTQ	110	2.392	3.512	0.007	16.016	2.078	6.535
FEC	110	0.061	0.042	0.008	0.132	0.201	1.548
LEV	110	0.155	0.176	0.000	0.885	1.745	6.509
FSV	110	9.815	1.118	8.239	12.412	0.935	2.802
AGE	110	46.954	14.487	20.000	81.000	0.361	2.591

Table 3. Correlation Matrix

VARIABLES	**ROA**	**FTQ**	**FEC**	**LEV**	**FSV**	**AGE**	**VIF**
ROA	1.000						
FTQ	-0.051**	1.000					
FEC	0.880***	0.055**	1.000				1.81
LEV	-0.387***	-0.033	0.109***	1.000			1.75
FSV	0.312***	-0.296***	-0.650***	-0.145***	1.0000		1.17
AGE	-0.039*	-0.299***	0.273***	-0.232***	-0.189***	1.000	1.11

Note: *, **, and *** stand for the significance level of 10%, 5%, and 1%, respectively

RESULTS AND DISCUSSION

This section presents the study's regression results for the models (I and II). It tested the hypothesis formulated with the regression results of the models. Thus, the regression results for the models are hereby presented.

3.1 Regression Results

Table 3 and 4 presents the study's regressions results for the two models formulated in the preceding section of this study, which were subsequently used to test the hypothesis formulated for the study. The best estimates amongst the variables run on a panel regression formulated for the two models were selected based on the dictates of the Hausman Specification test. It checks for the presence of endogeneity in the models from the first run result of Ordinary Least Square (OLS), then further conducts robust regression test after correcting heteroskedasticity, and finally run the Random Effect (RE) and Fixed Effect (FE) regression.

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume X Issue XII December 2023

3.1.1 Model I Regression Result

Table 3 presents a regression result for model I, which is the FE estimates of Driscoll-Kraay found to be more efficient than the RE, as dictated by the Hausman Specification test with a prob >chi2 = 0.0000 (See Appendix I).

Table 3 Estimates Fixed Effect Driscoll-Kraay Results of Model I

Variables	Coefficients	Z	p>/t/
FEC	2.174	8.23 ***	0.000
LEV	-0.373	-4.63 ***	0.001
FSV	0.085	10.03 ***	0.000
AGE	-0.002	-2.61 **	0.028
CONS	-0.721	-11.49***	0.000
R-squared	0.395		
P-Value			0.000

NOTE: *, **, *** Indicates significant@ 10%, 5% and 1% respectively

Table 3 results show that the firms' environmental cost influences the firms' financial performance (ROA) significantly and positively, which support H1. Thus, the study rejected the Null hypothesis (HO1) for the model, which implies that the more the listed industrial goods firms in Nigeria invests on environmental cost, it will significantly impact on their ROA. For instance, an increase in a unit of the Firms environmental cost will lead to an increase in ROA by 2.174. Thus, it shows the legitimacy of the firms to invest effectively on environmental cost, with an impressive return that catered for all its stakeholders interest, and will signal good information about the firms to the markets and to all and sundries. The finding supports the studies of Tochukwu (2018), Al-Mawali (2021), Fatah & Hamad (2022), and Oyedekon & Erinoso (2022).

3.1.2 Model I Regression result

Table 4 Estimates Fixed Effect, Heteroskedastic Panel Corrected Standard Errors Results of Model II

Variables	Coefficients	Z	p>/t/
FEC	-10.776	-0.88	0.376
LEV	-3.595	-2.46***	0.014
FSV	-1.508	-3.51***	0.000
AGE	-0.096	-5.89***	0.000
CONS	22.926	4.01***	0.000
R-squared	0.259		
P-Value			0.000

NOTE: *, **, *** Indicates significant@ 10%, 5% and 1% respectively

The result presented in table 4 is the fixed effect Linear regression, heteroskedastic panels corrected standard errors found more efficient, after the Hausman Specification test dictated in favour of FE as against RE with a prob >chi2 = 0.0108 (See appendix I).

Table 4 results shows that the firm's environmental cost affects Tobin's Q financial performance ratio

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume X Issue XII December 2023

insignificantly and negatively, which supports HO2. The model result indicates that the firm's environmental cost has a probability of 37.6% in affecting their market-Based financial performance ratio (Tobin's Q), based on its negative value of -0.88. Thus, based on the model result, the study failed to reject the model null hypothesis (HO2). This means that the firms' investment in environmental cost does not positively impact on the market-based financial performance indices (Tobin's Q). The finding is in line with the result found by Kurawa and Shuaibu (2022), but contradicts the result of Chiamogu and Okoye (2018).

On the other hand, the control variables that are made-up of leverage, firm's size and age were used in the models (I and II). In the first model, they are all found to significantly affect the firm's accounting based financial performance (ROA), with the firm size value impacting positively while the others (Leverage and Age) influence negatively. Similarly, in the second model (II) all the control variables affect the firms' market-based financial performance significantly, but with negative value respectively. This implies that the significant influence of firms' size and age on their financial performance is premised on experience and the advantage of economies of scale that comes with age and size respectively, and is in line with prior studies (Emeka & Benjamin, 2019; and Kurawa & Shuaibu, 2022). For the leverage, it supports the documented findings of prior studies (Nwanna & Glory, 2017; and Abubakar, 2017) that posits interest bearing debt have significant impact on the firm's financial performance, as higher debt will lead to a higher finance cost that is paid via higher interest expenses.

ROBUSTNESS CHECKS

The study conducted various robustness checks, with a diagnostic test for the study's independent and dependent variables. This was to ensure accurate data presentation, checks, and improve the validity and reliability of the panel data collected and regressed that is used to test the study's hypothesis (see appendix I). The checks include Normality Test of Residuals, multi collin earity, Robustness regression test, heteroskedasticity, VIF, and Hausman specification tests to select the superiority between FE and RE. Table 5 below presents a brief summary of some of the checks.

Table 5. Diagnostic Test on the Study Models

Model	Model Multicollinearity VIF test	Heteroskedasticity test	Hausman test
1	1.46	0.001 ***	0.001***
2	1.46	0.001***	0.011***

Note: *, **, and *** stand for the significance level of 10%, 5%, and 1%, respectively

CONCLUSION

Based on the evident mixed findings drawn from the study's two models results, which indicated that environmental cost influence accounting-based financial performance indices significantly and positively, while it influenced the market-based financial performance indices negatively and insignificantly, this study concluded that the environmental cost impact more on the firm's accounting-based financial performance indices than on the market-based financial performance indices. Thus, premised on the evident of the foregone findings, it practically implied that the management of the industrial goods firms in Nigeria are motivated to incur/invest on environmental cost due to its economic benefits on the accounting-based variables, specifically its influence on the firm's returns on asset that centrally catered for all stakeholders. It also signified that the firms are encouraged to efficiently utilized its asset in the conservation of the environment and minimized other externalities, because it positively impacts on their earning abilities and taxation strategy, and it confirm both the stakeholders and legitimacy theory.

The study therefore suggested an advancement of a further study on the subject matter, that will employ either a mediator or a moderator variable to investigates the possible divergent relationship that exist between firm environmental cost and corporate financial performance. Additionally, in line with global best practice, the management of the listed industrial goods firms in Nigeria are urge to be more responsible, by providing adequate environmental cost information on their yearly financial statements that is in line with the IFAC, 2005 four categorized cost, that includes waste recycling and remediation cost, labour and materials, domain costs that related to water, land and air, and any hidden and obvious environmental costs. This will enable the relevant stakeholders to assess and appreciate the firms' level of commitment to all environmental costs' variables, and it will enhance the general society trust and acceptability of the firms.

REFERENCES

1. Abd-Rajak, Z. S. (2022). Influence of the Implementation of Green Accounting, Environmental Performance and Liquidity on The Profitability of Manufacturing Companies in The Indonesia Stock Exchange In 2015 – 2019, Proceedings of International Conference on Economics, Business Management, Accounting, and Sustainability Bali, 30(30),30
2. Abubakar, A., A. (2017). Influence of Firms Attributes on Environmental Disclosure in Listed Brewery Companies in Nigeria, Research Journal of Finance and Accounting,8(21)2, 31-35
3. Al-Mawali, H. (2021). Environmental cost accounting and financial performance: The mediating role of environmental performance. Accounting, 7(3), 535-544.
4. Al-Waeli, A. J., Ismail, Z., & Khalid, A. A. (2020). The Impact of Environmental Costs on the Financial Performance of Industrial Companies in Iraq, International Journal of Management (IJM), 11(10), 1955-1969.
5. Ayu M., et al., (2020). The Impact of Environmental and Social Costs Disclosure on Financial Performance Mediating by Earning Management, Polish Journal of Management Studies, 21(2), 74-86.
6. Basuki, B. & Irwanda, R. D. (2018). Environmental Cost Analysis and Reporting to Measure Environmental Performance in Realizing Eco-Efficiency at PT Industri Kereta Api (Persero), Asian Journal of Accounting Research, 3(2), 169-180. DOI 10.1108/AJAR-06-2018-0013
7. Chiamogu, A. & Okoye, J. N (2020). Environmental Cost and Financial Performance of Oil and Gas Companies in Nigeria, International Journal of Advanced Academic Research (Social and Management Sciences) 6(10), 1-24, DOI: 10.46654/ij.24889849
8. Dewiyanti, S. (2021). Legitimacy Theory and its Relationship to CSR, Accounting, Binus Higher Education.
9. Emeka-Nwokeji, N. A & Benjamin, O. C., (2019). Sustainability disclosures and Market Value in Emerging Economy: Evidence from Nigeria, European Journal of Accounting, Auditing and Finance Research,7(3),1-19
10. Emmanuel, O. G., Elvis, E. & Abiola, T. (2019). Environmental Accounting Disclosure and Firm Value of Industrial Goods Companies in Nigeria, IOSR Journal of Economics and Finance, 10(1), 07-27
11. Fatah, N. A. & Hamad, H. A. (2022). The impact of Environmental Accounting on Financial Performance: Evidence from Oil Companies in IRAQ, The impact of Environmental Accounting on Financial Performance: Evidence from Oil Companies in Iraq, Qalaai Zanist scientific Journal, 7(4), 1168-1184. **Doi:** 25212/lfu.qzj.7.4.45
12. Franco-Santos, M., et al., (2007). Towards a definition of a Business Performance Measurement System, International Journal of Operations and Production Management, 27(8),784-801.
13. Harash, E., AL-Timini, S., & Alsaadi, J. (2014). Effects of Financing on Performance of Small and Medium Enterprises, International Journal of Management, 2, 1-9.
14. Idowu, A. & Agboola, O. S. (2021). Environmental costs and financial performance in Nigeria's

selected extractive industry. KIU Interdisciplinary Journal of Humanities and Social Sciences, 2(3), 134-155

15. Mokhtar, M. Z. & Ismail, W. S. N., (2012). Marketing Strategies and the Differences Level of Sales and Profits Performance of the Batik SMEs In Malysia, International Journal of Business Management, 23(7), 96
16. Kenton, W. (2022). Financial Statement Analysis. Retrieved from www.coursehero.com
17. Kinyua, J. K., Gakure, R., Gekara, M. & Orwa, G. (2015). Effect Of Risk Management on The Financial Performance of Companies Quoted in The Nairobi Securities Exchange, International Journal of Business & Law Research 3(4), 26-42.
18. Kurawa, J. M. & Shuaibu K. (2022). Environmental Disclosure and Financial Performance of Listed Non-Financial Companies in Nigeria, European Journal of Accounting, Auditing and Finance Research, 10 (2), 31-51
19. Mazahrih, B. (2019). Integration Of Environmental Costs into Accounting Information System, Academy of Accounting and Financial Studies Journal, 23(4),
20. Mishkin, F. S. (2007). Financial Instability and Monetary Policy. Risk US Conference 2007, New York.
21. Naz, F., Ijaz, F. and Naqvi, F. (2016). Financial Performance of Firms: Evidence from Pakistan Cement Industry, Journal of Teaching and Education, 05 (01), 81 – 94.
22. Nwakaego, O. S, Uzoma, I. J. & Belonwu, A. J. (2020). Environmental Costs Accounting and the Earnings of Oil Firms in Nigeria, IIARD International Journal of Economics and Business Management, 6(2), 37-51.
23. Nwanna, I. O. & Glory, I. (2017). Effect of Financial Leverage on Firm's Performance: A study of Nigerian Banks (2006 – 2015), International Journal of Recent Scientific Research, 8(7), 18554-18564.
24. Ogbu, I. I., Nwafor, O. C. & Onyeanu, E. O. (2021). Environmental Remediation Cost Management and Social Harmony of Solid Mineral Resource-Based Communities Cum Firm Performance in Nigeria, International Journal of Management (IJM), 12(9),136-150
25. Okafor, T. G. (2018). Environmental Costs Accounting and Reporting on Firm Financial Performance: A Survey of Quoted Nigerian Oil Companies, International Journal of Finance and Accounting, 7(1), 1-6 DOI: 10.5923/j.ijfa.20180701.01
26. Otley, D. (2016). The Contingency Theory of Management Accounting and Control: 1980 – 2014, Management Accounting Research, Elsevier Ltd, 31,45-62 DOI: 10.10.16/j.mar.2016.02
27. Oyedokun, G. E., & Erinoso, O. M. (2022). Environmental Conservation, Sustainability and Financial Performance of listed Oil and Gas Companies in Nigeria, International Journal of Research and Innovation in Social Science (IJRISS), VI (VIII), 582-590.
28. Pandey, S. N. & Kumar, A. (2016). Exploring the Association between Environmental Cost and Corporate Financial Performance: A Study of Selected NIFTY Companies, NMIMS Management Review, XXXII, 12-21
29. Pham, D. C. Et al (2021). The impact of sustainability practices on financial performance: empirical evidence from Sweden, Cogent Business & Management, 8(1), 1912526, DOI: 10.1080/23311975.2021.1912526
30. Sief, H. S. (2014). Accounting Framework to Measure the Environmental Costs and Disclosed in Industrials Companies—Case Study of Societe Cement Hamma Bouziane (SCHB) in Constantine, Chinese Business Review, 13(6), 356-366
31. WEF (2023). The Global Risks Report 2023.
32. Yan, L. (2014). Research on Measurement Methods of Enterprise's Environmental Costs, 3rd International Conference on Science and Social Research.
33. Zhang, D. and Wellalage, N. H. (2022). Comparative analysis of environmental performance measures and their impact on firms' financing choices, Journal of Cleaner Production, 375, 1-11.
34. Zijl, W. V. Wostmann, C. & Maroun, W. (2017). Strategy Disclosure by Listed Financial Service Companies: Signalling Theory, Legitimacy Theory and South African Integrated Reporting Practice, South Africa Journal of Business Management, 48(3), 73-85.

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume X Issue XII December 2023

APPENDIX 1

Study Model I

```
  ___  ____  ____  ____  ____ (R)
 /__    /   ____/   /   ____/
___/   /   /___/   /   /___/   14.2   Copyright 1985-2015 StataCorp LP
  Statistics/Data Analysis             StataCorp
                                       4905 Lakeway Drive
     Special Edition                   College Station, Texas 77845 USA
                                       800-STATA-PC        http://www.stata.com
                                       979-696-4600        stata@stata.com
                                       979-696-4601 (fax)

Single-user Stata perpetual license:
       Serial number:  10699393
         Licensed to:  Andrey
Notes:
      1.  Unicode is supported; see help unicode_advice.
      2.  Maximum number of variables is set to 5000; see help set_maxvar.

. *(8 variables, 110 observations pasted into data editor)

. describe
Contains data
  obs:           110
 vars:             8
 size:         2,750
-------------------------------------------------------------------------------------------------------------------
-------------------------------------------------------------
              storage   display    value
variable name   type    format     label      variable label
-------------------------------------------------------------------------------------------------------------------
-------------------------------------------------------------
firms           int     %8.0g                 FIRMs
year            int     %8.0g                 Year
roa             float   %8.0g                 ROA
ftq             float   %8.0g                 FTQ
fec             float   %8.0g                 FEC
lev             float   %8.0g                 LEV
fsv             float   %8.0g                 FSV
age             byte    %8.0g                 AGE
-------------------------------------------------------------------------------------------------------------------
-------------------------------------------------------------
Sorted by:
     Note: Dataset has changed since last saved.

. tabstat roa ftq fec lev fsv age
   stats |       roa       ftq       fec       lev       fsv       age
---------+--------------------------------------------------------------
    mean |  .0894609  2.392218  .0654795  .1548664  9.815497  46.95455
------------------------------------------------------------------------

. tabstat roa ftq fec lev fsv age, stat (skewness kurtosis)col(stat)
    variable |  skewness  kurtosis
-------------+--------------------
         roa | -1.778957  21.87006
         ftq |  2.078361  6.535368
         fec |  3.818878  29.00404
         lev |   1.74546    6.5091
         fsv |  .9348968  2.801871
         age |  .3605826  2.590665
----------------------------------

. winsor roa, gen(roa1)p(0.05)

. winsor fec, gen(fec1)p(0.05)

. tabstat roa1 ftq fec1 lev fsv age, stat (skewness kurtosis)col(stat)
```

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume X Issue XII December 2023

```
    variable |  skewness  kurtosis
-------------+--------------------
        roa1 |  1.012405  4.240123
         ftq |  2.078361  6.535368
        fec1 |  .2013726  1.548217
         lev |   1.74546    6.5091
         fsv |  .9348968  2.801871
         age |  .3605826  2.590665
----------------------------------

. tabstat roa1 ftq fec1 lev fsv age, statistics( count mean sd min max skewness kurtosis )
columns(statistics)
    variable |         N      mean        sd       min       max  skewness  kurtosis
-------------+------------------------------------------------------------------------
        roa1 |       110  .0988855  .1629695     -.149     .5402  1.012405  4.240123
         ftq |       110  2.392218   3.51237     .0071   16.0158  2.078361  6.535368
        fec1 |       110  .0614736  .0419359  .0082487  .1323809  .2013726  1.548217
         lev |       110  .1548664  .1761667         0     .8854   1.74546    6.5091
         fsv |       110  9.815497  1.117778    8.2394    12.412  .9348968  2.801871
         age |       110  46.95455  14.48656        20        81  .3605826  2.590665
------------------------------------------------------------------------------------

. correlate roa1 ftq fec1 lev fsv age
(obs=110)
             |     roa1      ftq     fec1      lev      fsv      age
-------------+------------------------------------------------------
        roa1 |   1.0000
         ftq |  -0.0505   1.0000
        fec1 |   0.0880   0.0553   1.0000
         lev |  -0.3865  -0.0331   0.1087   1.0000
         fsv |   0.3125  -0.2957  -0.6496  -0.1447   1.0000
         age |  -0.0393  -0.2990   0.2733  -0.2316  -0.1886   1.0000

. regress roa1 ftq fec1 lev fsv age
      Source |       SS           df       MS      Number of obs   =       110
-------------+----------------------------------   F(5, 104)       =     13.61
       Model |  1.14497685         5   .22899537   Prob > F        =    0.0000
    Residual |  1.74995922       104  .016826531   R-squared       =    0.3955
-------------+----------------------------------   Adj R-squared   =    0.3664
       Total |  2.89493607       109  .026559046   Root MSE        =    .12972
------------------------------------------------------------------------------
        roa1 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         ftq |    .001605   .0041099     0.39   0.697    -.0065452    .0097551
        fec1 |   2.190872   .4015253     5.46   0.000     1.394632    2.987112
         lev |  -.3673405   .0756311    -4.86   0.000    -.5173198   -.2173613
         fsv |   .0876279   .0159578     5.49   0.000      .055983    .1192728
         age |  -.0018179   .0010082    -1.80   0.074    -.0038173    .0001814
       _cons |  -.7574975   .1937953    -3.91   0.000    -1.141801   -.3731941
------------------------------------------------------------------------------


. regress roa1 fec1 lev fsv age

      Source |       SS           df       MS      Number of obs   =       110
-------------+----------------------------------   F(4, 105)       =     17.11
       Model |  1.14241087         4  .285602717   Prob > F        =    0.0000
    Residual |   1.7525252       105  .016690716   R-squared       =    0.3946
-------------+----------------------------------   Adj R-squared   =    0.3716
       Total |  2.89493607       109  .026559046   Root MSE        =    .12919
------------------------------------------------------------------------------
        roa1 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        fec1 |   2.173577   .3974616     5.47   0.000     1.385484     2.96167
         lev |  -.3731103   .0738739    -5.05   0.000    -.5195885   -.2266321
         fsv |    .085207    .014645     5.82   0.000     .0561688    .1142453
         age |  -.0019721    .000924    -2.13   0.035    -.0038042   -.0001399
       _cons |  -.7207017   .1686615    -4.27   0.000    -1.055126   -.3862771
------------------------------------------------------------------------------

. estat vif
    Variable |       VIF       1/VIF
-------------+----------------------
```

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume X Issue XII December 2023

```
        fec1 |      1.81    0.551171
         fsv |      1.75    0.571427
         age |      1.17    0.854614
         lev |      1.11    0.904106
-------------+----------------------
    Mean VIF |      1.46

. estat hettest
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of roa1
         chi2(1)      =    11.10
         Prob > chi2  =   0.0009

. rreg roa1 fec1 lev fsv age
   Huber iteration 1:  maximum difference in weights = .75477248
   Huber iteration 2:  maximum difference in weights = .16603909
   Huber iteration 3:  maximum difference in weights = .06209863
   Huber iteration 4:  maximum difference in weights = .03265928
Biweight iteration 5:  maximum difference in weights = .29412325
Biweight iteration 6:  maximum difference in weights = .21372947
Biweight iteration 7:  maximum difference in weights = .09276271
Biweight iteration 8:  maximum difference in weights = .05521548
Biweight iteration 9:  maximum difference in weights = .0356094
Biweight iteration 10:  maximum difference in weights = .01735444
Biweight iteration 11:  maximum difference in weights = .00529115

Robust regression                               Number of obs     =        110
                                                F(  4,       105) =      20.46
                                                Prob > F          =     0.0000
------------------------------------------------------------------------------
        roa1 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        fec1 |    .860302   .2627495     3.27   0.001     .3393183    1.381286
         lev |  -.2066354   .0488357    -4.23   0.000    -.3034675   -.1098032
         fsv |   .0633372   .0096813     6.54   0.000     .0441409    .0825335
         age |  -.0021944   .0006108    -3.59   0.001    -.0034055   -.0009832
       _cons |  -.4722386   .1114969    -4.24   0.000    -.6933163    -.251161
------------------------------------------------------------------------------

. xtset firms year, yearly
       panel variable:  firms (strongly balanced)
        time variable:  year, 2012 to 2021
                delta:  1 year

. xtreg roa1 fec1 lev fsv age, re

Random-effects GLS regression                   Number of obs     =        110
Group variable: firms                           Number of groups  =         11
R-sq:                                           Obs per group:
     within  = 0.0477                                         min =         10
     between = 0.4989                                         avg =       10.0
     overall = 0.3172                                         max =         10
                                                Wald chi2(4)      =      12.82
corr(u_i, X)   = 0 (assumed)                    Prob > chi2       =     0.0122
------------------------------------------------------------------------------
        roa1 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        fec1 |   .5774748    .499334     1.16   0.247    -.4012018    1.556151
         lev |  -.2562619   .0864028    -2.97   0.003    -.4256082   -.0869156
         fsv |   .0396706    .026994     1.47   0.142    -.0132368     .092578
         age |   -.001749   .0017324    -1.01   0.313    -.0051444    .0016465
       _cons |  -.2041923    .296515    -0.69   0.491    -.7853511    .3769665
-------------+----------------------------------------------------------------
     sigma_u |  .08379342
     sigma_e |  .09824485
         rho |  .42111041   (fraction of variance due to u_i)
------------------------------------------------------------------------------

. estimates store re

. xtreg roa1 fec1 lev fsv age, fe
```

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume X Issue XII December 2023

```
Fixed-effects (within) regression               Number of obs      =       110
Group variable: firms                           Number of groups   =        11
R-sq:                                           Obs per group:
     within  = 0.0754                                         min =        10
     between = 0.0332                                         avg =      10.0
     overall = 0.0051                                         max =        10
                                                F(4,95)            =      1.94
corr(u_i, Xb)  = -0.4980                        Prob > F           =    0.1108
------------------------------------------------------------------------------
        roa1 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        fec1 |  -.2126451   .5553085    -0.38   0.703    -1.315072    .8897816
         lev |  -.2265385   .0927931    -2.44   0.016    -.4107562   -.0423208
         fsv |  -.0586511   .0721252    -0.81   0.418    -.2018378    .0845357
         age |  -.0020871   .0036562    -0.57   0.569    -.0093455    .0051712
       _cons |    .820731   .6636317     1.24   0.219    -.4967444    2.138206
-------------+----------------------------------------------------------------
     sigma_u |  .16157852
     sigma_e |  .09824485
         rho |  .73008555   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0: F(10, 95) = 8.66                     Prob > F = 0.0000

. estimates store fe

. hausman fe re
                ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |       fe           re         Difference          S.E.
-------------+----------------------------------------------------------------
        fec1 |   -.2126451     .5774748       -.7901199        .2429673
         lev |   -.2265385    -.2562619        .0297234        .0338397
         fsv |   -.0586511     .0396706       -.0983216        .0668833
         age |   -.0020871     -.001749       -.0003382        .0032197
------------------------------------------------------------------------------
                           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(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       17.71
                Prob>chi2 =      0.0014

. xttest3
Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model
H0: sigma(i)^2 = sigma^2 for all i
chi2 (11)  =    4197.00
Prob>chi2 =      0.0000


. xtcsd,pesaran abs
Pesaran's test of cross sectional independence =    -1.330, Pr = 0.1834
Average absolute value of the off-diagonal elements =     0.311

. xtserial roa1 fec1 lev fsv age
Wooldridge test for autocorrelation in panel data
H0: no first order autocorrelation
    F(  1,      10) =      1.168
           Prob > F =      0.3051

. xtpcse roa1 fec1 lev fsv age
Linear regression, correlated panels corrected standard errors (PCSEs)
Group variable:   firms                         Number of obs      =       110
Time variable:    year                          Number of groups   =        11
Panels:           correlated (balanced)         Obs per group:
Autocorrelation:  no autocorrelation                                 min =        10
                                                                     avg =        10
                                                                     max =        10
Estimated covariances      =        66          R-squared          =    0.3946
Estimated autocorrelations =         0          Wald chi2(4)       =     62.59
Estimated coefficients     =         5          Prob > chi2        =    0.0000
------------------------------------------------------------------------------
```

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume X Issue XII December 2023

```
             |            Panel-corrected
        roa1 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        fec1 |   2.173577   .3885309     5.59   0.000     1.412071    2.935084
         lev |  -.3731103   .0789655    -4.72   0.000    -.5278798   -.2183409
         fsv |    .085207   .0111246     7.66   0.000     .0634033    .1070108
         age |  -.0019721   .0009002    -2.19   0.028    -.0037365   -.0002077
       _cons |  -.7207017   .1150989    -6.26   0.000    -.9462914    -.495112
------------------------------------------------------------------------------

. xtpcse roa1 fec1 lev fsv age, hetonly

Linear regression, heteroskedastic panels corrected standard errors

Group variable:   firms                         Number of obs     =        110
Time variable:    year                          Number of groups  =         11
Panels:           heteroskedastic (balanced)    Obs per group:
Autocorrelation:  no autocorrelation                          min =         10
                                                              avg =         10
                                                              max =         10
Estimated covariances      =        11          R-squared         =     0.3946
Estimated autocorrelations =         0          Wald chi2(4)      =      75.16
Estimated coefficients     =         5          Prob > chi2       =     0.0000

------------------------------------------------------------------------------
             |             Het-corrected
        roa1 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        fec1 |   2.173577   .4323386     5.03   0.000     1.326209    3.020945
         lev |  -.3731103   .0821868    -4.54   0.000    -.5341934   -.2120272
         fsv |    .085207   .0116146     7.34   0.000     .0624428    .1079712
         age |  -.0019721   .0009137    -2.16   0.031    -.0037629   -.0001812
       _cons |  -.7207017   .1360987    -5.30   0.000    -.9874502   -.4539533
------------------------------------------------------------------------------

. xtscc roa1 fec1 lev fsv age
Regression with Driscoll-Kraay standard errors   Number of obs     =       110
Method: Pooled OLS                               Number of groups  =        11
Group variable (i): firms                        F(  4,     9)     =     65.75
maximum lag: 2                                   Prob > F          =    0.0000
                                                 R-squared         =    0.3946
                                                 Root MSE          =    0.1292
------------------------------------------------------------------------------
             |              Drisc/Kraay
        roa1 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        fec1 |   2.173577   .2611015     8.32   0.000     1.582925     2.76423
         lev |  -.3731103   .0806548    -4.63   0.001    -.5555643   -.1906564
         fsv |    .085207   .0084916    10.03   0.000     .0659977    .1044164
         age |  -.0019721   .0007557    -2.61   0.028    -.0036816   -.0002626
       _cons |  -.7207017   .0627452   -11.49   0.000    -.8626412   -.5787622
------------------------------------------------------------------------------
```

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume X Issue XII December 2023

Study Model II

```
. regress ftq fec1 lev fsv age

      Source |       SS           df       MS      Number of obs   =       110
-------------+----------------------------------   F(4, 105)       =      9.19
       Model |  348.560732         4   87.140183   Prob > F        =    0.0000
    Residual |  996.143976       105  9.48708548   R-squared       =    0.2592
-------------+----------------------------------   Adj R-squared   =    0.2310
       Total |  1344.70471       109  12.3367404   Root MSE        =    3.0801
------------------------------------------------------------------------------
         ftq |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        fec1 |  -10.77564    9.47598    -1.14   0.258    -29.56476    8.013478
         lev |  -3.594968   1.761245    -2.04   0.044    -7.087191   -.1027457
         fsv |   -1.50836   .3491542    -4.32   0.000    -2.200668   -.8160513
         age |  -.0960401   .0220294    -4.36   0.000    -.1397204   -.0523599
       _cons |    22.9262     4.0211     5.70   0.000      14.9531    30.89929
------------------------------------------------------------------------------

. vif
    Variable |       VIF       1/VIF
-------------+----------------------
        fec1 |      1.81    0.551171
         fsv |      1.75    0.571427
         age |      1.17    0.854614
         lev |      1.11    0.904106
-------------+----------------------
    Mean VIF |      1.46

. estat hettest
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of ftq
         chi2(1)      =    40.85
         Prob > chi2  =   0.0000

. rreg ftq fec1 lev fsv age
   Huber iteration 1:  maximum difference in weights = .6743077
   Huber iteration 2:  maximum difference in weights = .39739898
   Huber iteration 3:  maximum difference in weights = .16712793
   Huber iteration 4:  maximum difference in weights = .09119277
   Huber iteration 5:  maximum difference in weights = .06353332
   Huber iteration 6:  maximum difference in weights = .02900497
Biweight iteration 7:  maximum difference in weights = .28344782
Biweight iteration 8:  maximum difference in weights = .16706177
Biweight iteration 9:  maximum difference in weights = .01745157
Biweight iteration 10:  maximum difference in weights = .01210296
Biweight iteration 11:  maximum difference in weights = .00525957

Robust regression                               Number of obs     =        110
                                                F(  4,       105) =      14.79
                                                Prob > F          =     0.0000
------------------------------------------------------------------------------
         ftq |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        fec1 |    18.0497      3.893     4.64   0.000      10.3306     25.7688
         lev |   1.940003    .723569     2.68   0.009     .5052996    3.374707
         fsv |  -.0240325   .1434424    -0.17   0.867    -.3084523    .2603872
         age |  -.0321553   .0090503    -3.55   0.001    -.0501004   -.0142102
       _cons |   1.577256   1.651981     0.95   0.342    -1.698318     4.85283
------------------------------------------------------------------------------

. xtset firms year, yearly
       panel variable:  firms (strongly balanced)
        time variable:  year, 2012 to 2021
                delta:  1 year

. xtreg ftq fec1 lev fsv age, re
Random-effects GLS regression                   Number of obs     =        110
Group variable: firms                           Number of groups  =         11
R-sq:                                           Obs per group:
     within  = 0.1789                                         min =         10
```

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume X Issue XII December 2023

```
     between = 0.0502                                        avg =       10.0
     overall = 0.0504                                        max =         10
                                             Wald chi2(4)      =      13.07
corr(u_i, X)   = 0 (assumed)                 Prob > chi2       =     0.0109
------------------------------------------------------------------------------
         ftq |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        fec1 |   4.294381   8.084234     0.53   0.595    -11.55043    20.13919
         lev |  -.3854344   1.365745    -0.28   0.778    -3.062246    2.291377
         fsv |  -2.291857   .7383388    -3.10   0.002    -3.738974   -.8447392
         age |   .0321917   .0424058     0.76   0.448     -.050922    .1153055
       _cons |   23.17208   7.377912     3.14   0.002      8.71164    37.63252
-------------+----------------------------------------------------------------
     sigma_u |  3.4401203
     sigma_e |  1.4106937
         rho |  .85604839   (fraction of variance due to u_i)
------------------------------------------------------------------------------

. estimates store re

. xtreg ftq fec1 lev fsv age, fe
Fixed-effects (within) regression               Number of obs     =       110
Group variable: firms                           Number of groups  =        11
R-sq:                                           Obs per group:
     within  = 0.2071                                         min =         10
     between = 0.0207                                         avg =       10.0
     overall = 0.0229                                         max =         10
                                                F(4,95)           =      6.20
corr(u_i, Xb)  = -0.8626                        Prob > F          =     0.0002
------------------------------------------------------------------------------
         ftq |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        fec1 |   1.518475   7.973651     0.19   0.849    -14.31122    17.34817
         lev |  -.5984061   1.332413    -0.45   0.654     -3.24358    2.046768
         fsv |  -4.647664   1.035643    -4.49   0.000    -6.703675   -2.591652
         age |   .1464347   .0524985     2.79   0.006      .042212    .2506575
       _cons |    41.1349   9.529059     4.32   0.000     22.21732    60.05247
-------------+----------------------------------------------------------------
     sigma_u |  6.6299402
     sigma_e |  1.4106937
         rho |  .95668721   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0: F(10, 95) = 40.56                     Prob > F = 0.0000

. estimate store fe

. hausman fe re
                ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |       fe           re         Difference          S.E.
-------------+----------------------------------------------------------------
             fec1 |    1.518475     4.294381       -2.775905               .
         lev |   -.5984061    -.3854344       -.2129717               .
         fsv |   -4.647664    -2.291857       -2.355807         .726232
         age |    .1464347     .0321917         .114243        .0309491
------------------------------------------------------------------------------
                           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(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       13.10
                Prob>chi2 =      0.0108
                (V_b-V_B is not positive definite)

. xttest3
Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model
H0: sigma(i)^2 = sigma^2 for all i
chi2 (11)  =    2.4e+05
Prob>chi2 =      0.0000

. xtcsd,pesaran abs
Pesaran's test of cross-sectional independence =    -0.384, Pr = 0.7011
```

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume X Issue XII December 2023

```
Average absolute value of the off-diagonal elements =     0.493

. xtserial ftq fec1 lev fsv age
Wooldridge test for autocorrelation in panel data
H0: no first order autocorrelation
    F(  1,      10) =    215.899
           Prob > F =      0.0000

. xtpcse ftq fec1 lev fsv age
Linear regression, correlated panels corrected standard errors (PCSEs)
Group variable:   firms                         Number of obs     =        110
Time variable:    year                          Number of groups  =         11
Panels:           correlated (balanced)         Obs per group:
Autocorrelation:  no autocorrelation                          min =         10
                                                              avg =         10
                                                              max =         10
Estimated covariances      =        66          R-squared         =     0.2592
Estimated autocorrelations =         0          Wald chi2(4)      =     152.23
Estimated coefficients     =         5          Prob > chi2       =     0.0000
------------------------------------------------------------------------------
             |           Panel-corrected
         ftq |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        fec1 |  -10.77564   7.035428    -1.53   0.126    -24.56483    3.013544
         lev |  -3.594968   1.014319    -3.54   0.000    -5.582997    -1.60694
         fsv |   -1.50836    .267928    -5.63   0.000    -2.033489   -.9832303
         age |  -.0960401   .0119578    -8.03   0.000    -.1194769   -.0726034
       _cons |    22.9262   3.705412     6.19   0.000     15.66372    30.18867
------------------------------------------------------------------------------

. xtpcse ftq fec1 lev fsv age, hetonly
Linear regression, heteroskedastic panels corrected standard errors
Group variable:   firms                         Number of obs     =        110
Time variable:    year                          Number of groups  =         11
Panels:           heteroskedastic (balanced)    Obs per group:
Autocorrelation:  no autocorrelation                          min =         10
                                                              avg =         10
                                                              max =         10
Estimated covariances      =        11          R-squared         =     0.2592
Estimated autocorrelations =         0          Wald chi2(4)      =      46.92
Estimated coefficients     =         5          Prob > chi2       =     0.0000
------------------------------------------------------------------------------
             |            Het-corrected
         ftq |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        fec1 |  -10.77564   12.17593    -0.88   0.376    -34.64002    13.08874
         lev |  -3.594968   1.459532    -2.46   0.014      -6.4556   -.7343374
         fsv |   -1.50836   .4295553    -3.51   0.000    -2.350272   -.6664467
         age |  -.0960401   .0163119    -5.89   0.000    -.1280109   -.0640693
       _cons |    22.9262   5.715733     4.01   0.000     11.72356    34.12883
------------------------------------------------------------------------------

. xtscc ftq fec1 lev fsv age
Regression with Driscoll-Kraay standard errors   Number of obs     =       110
Method: Pooled OLS                               Number of groups  =        11
Group variable (i): firms                        F(  4,     9)     =     86.85
maximum lag: 2                                   Prob > F          =    0.0000
                                                 R-squared         =    0.2592
                                                 Root MSE          =    3.0801
------------------------------------------------------------------------------
             |             Drisc/Kraay
         ftq |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        fec1 |  -10.77564   14.37623    -0.75   0.473    -43.29692    21.74564
         lev |  -3.594968   1.331162    -2.70   0.024    -6.606266    -.583671
         fsv |   -1.50836   .4869522    -3.10   0.013    -2.609922   -.4067971
         age |  -.0960401   .0143612    -6.69   0.000    -.1285274   -.0635529
       _cons |    22.9262    6.30229     3.64   0.005     8.669426    37.18297
------------------------------------------------------------------------------
```

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume X Issue XII December 2023

APPENDIX II

Table 1 Sampled Population of Listed Industrial Goods Firms in Nigeria

S/N	Company	Sector	Date Listed	Date Incorporated
1	Austin Laz & Company Plc.	Industrial Goods	2010	1982
2	Berger Paints Plc.	Industrial Goods	1969	1959
3	Beta Glass Plc.	Industrial Goods	1986	1974
4	Cap Plc.	Industrial Goods	1978	1965
5	Cutix Plc.	Industrial Goods	1987	1982
6	Dangote Cement Plc.	Industrial Goods	2010	1992
7	Greif Nigeria Plc.	Industrial Goods	1979	1940
8	Lafarge Africa Plc.	Industrial Goods	1979	1959
9	Meyer Plc.	Industrial Goods	1979	1960
10	Premier Paints Plc.	Industrial Goods	1995	1982
11	Tripple Gee & Company Plc.	Industrial Goods	1980	1970

Source: NSE Daily Stock Listing as at 31st December, 2021.