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Kontakt/Contact
ZBW – Leibniz-Informationszentrum Wirtschaft/Leibniz Information Centre for Economics
Düsternbrooker Weg 120
24105 Kiel (Germany)
E-Mail: *rights[at]zbw.eu*
https://www.zbw.eu/econis-archiv/

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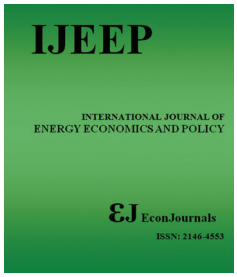

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The Roles of Ownership Structure on Carbon Emission Disclosure Quality of the Listed Oil and Gas Companies in Nigeria

Ezekiel Oluwagbemiga Oyerogba[1]*, Sunday Kola Olugbenro[2], Sunday O. Omojola[3], Olatunde Wright[3], Olateju Dolapo Aregbesola[3], Temiloluwa Olatundun Akinsola[3], Inioluwa Amu[3]

[1]Accounting and Finance Programme, College of Management and Social Sciences, Bowen University, Iwo, Nigeria, [2]Department of Bursary, Oyo State College of Education, Lanlate, Nigeria. [3]Accounting and Finance Programme, Bowen University, Iwo, Nigeria. *Email: ezekiel.oyerogba@bowen.edu.ng

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ABSTRACT

This study investigates how and the extent to which different forms of ownership (foreign, managerial, diluted, concentrated and institutional) influences carbon emission disclosure quality as shown in the levels of the voluntary carbon emission related disclosures in the stand-alone sustainability report of the listed oil and gas companies in Nigeria. Hence, we complement the three leading streams of research on the determinants of carbon emission disclosure quality. We analyzed the research objective using data from the 22 listed oil and gas companies in Nigeria since they are the dominant greenhouse gas emitters globally and show higher commitment to pursuing companies and industrial actions in communicating environmental related information with the external stakeholders, that may reflect attitudinal changes and product sensitive innovations to reducing emission of carbon, carbon management, and targets. Using an ordered logistic regression analysis, we found several important results. First, the findings revealed that firms with greater proportion of foreign ownership exhibit higher carbon emissions disclosure quality, which suggest that the type of ownership correspond with firm's proactiveness and commitment to environmental practices in the selected companies. Second, institutional ownership in negatively correlated with carbon emission disclosure quality, providing an implication that when institutions invest heavily in a company, they favor weak carbon related disclosure because it enables them to exploit minority shareholders. Third, we observed a negative correlation between ownership concentration and carbon emission disclosure, which indicates that controlling shareholders in form of institutional ownership may be prone to monopolizing carbon emission information to maintain superiority in monitoring and decision-making process.

Keywords: Ownership Structure, Carbon Emission Disclosure, Institutional Ownership, Managerial Ownership, Concentrated Ownership
JEL Classifications: C32, 013, 047

1. INTRODUCTION

The 2030 sustainable development agenda adopted in 2015 by all United Nation members that created 17 Sustainable Development Goals (SDG) is a landmark achievement in the multilateral climate change initiatives (Nasih et al., 2019). This resulted in a rapid and vast investment in carbon-related activities such as verification, monitoring, and corporate reporting (Naseem et al., 2017). Consequently, different stakeholders (e.g. analysts, customers, government agencies, investors, customers and host communities) are imperceptibly interested in the disclosure of non-financial information regarding carbon emission, relevant strategic risks, global warming impacts, and opportunities to improve the degree of transparency, long term sustainable growth

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and corporate accountability (Mardani et al., 2021). Therefore, firm's commitment to reporting climate change has become an important proxy for measuring firm performance.

This study investigates how and the extent to which different forms of ownership (foreign, managerial, diluted, concentrated and institutional) influences carbon emission disclosure quality as shown in the levels of the voluntary carbon emission related disclosures in the stand-alone sustainability report of the listed oil and gas companies in Nigeria. Hence, we complement the three leading streams of research on the determinants of carbon emission disclosure quality. The first stream of literatures focusses mainly on the board composition and structure (board independence, board size, gender diversity, interlocking,) (Oyerogba et al, 2024; Oluwagbemiga 2021; Adwally, 2015; Oyerogba & Ogungbade, 2020). The second stream focuses on corporate governance mechanisms (board meetings, risk management, board oversight functions, audit committee independence) (Kumar, 2019; Mardani et al., 2019; Kanagaraj and Gouwsigan, 2021) the third stream is concerned with certain firm-specific variables such as growth, capital gearing, firm performance, and firm size (Ogungbade and Oyerogba, 2020; Oyerogba et al., 2017; Nasih et al., 2019).

As reported by Elgayar et al. (2024) and Daruwala (2023), there is little effort on carbon emission disclosure quality stimulated by the various forms of corporate ownership. The neglect of this variable in existing literature is worrisome because the type of ownership is an important variable that represent a company's identity (Oluwagbemiga, 2021). Therefore, this study explores the relationship between this important corporate governance variable and the emerging behavior of companies to publicly disclose information on carbon related activities. Our selected ownership (i.e. foreign, managerial, diluted, concentrated and institutional) are prominent categories of stakeholders, that can lend a voice in strategic decision associated with business development/risk management, especially, carbon emission disclosure as they can use disclosed carbon related information for various purposes (e.g. investment decision, carbon performance measurement, evaluation of the values of portfolios, estimation of carbon emission controls costs, and determination of a business prospect).

However, these dominant stakeholders would be able to access information directly from the management because of their voting right and power (Bhatia and Tuli, 2017). Therefore, they might either discourage or pressure management for quality carbon emission disclosure. Again, usually the ownership structure is primally heterogeneous, leading to various objectives and investment horizons, various investors with different preferences might behave divergently, stimulating drivers of a company's carbon emission disclosure. For instance, an investor with long-term investment and sustainability agenda, in form of institutional holdings or government-owned enterprises, could stimulate the management to disclose higher voluntary information on carbon emission to promote the accountability and transparency of firms.

On the other hand, short-term investors and management could pay less attention to long-term economic benefits while focusing on short term benefits at the expense of other external stakeholders by avoiding disclosure of sensitive information that could be inimical to the short-term benefit (Biswas et al., 2018). Apparently, the correlation between carbon emission disclosure and ownership structures appears to be unclear and inconclusive, and this requires more research efforts.

This study employed two theories in making predictions about the relationship between ownership structure and carbon emission disclosure quality. Firstly, the agency theory (Jensen and Meckling, 1976) emphasizes the significant roles of higher disclosure of carbon related information to stakeholders, which helps mitigating the agency conflicts between shareholders and management triggered by information asymmetry problems (Bektur and Arzova, 2020). However, not all investors and stakeholders have similar preferences and motivations in information disclosed, especially carbon emission related information, which consequently influence company performance and their own benefits (Ben-Amar and Mcilkenny, 2014; Beji et al., 2021; Baidoo, 2022). Secondly, the political cost theory (Ararat and Sayedy 2019) asserts that companies engage in higher voluntary information disclose because of economic benefits; notably, they tend to provide higher disclosure to reduce political costs (Amoa-Gyarteng, 2021).

Particularly, concerning carbon emission and environmental related disclosure, existing literature documents that organizations with sensitive carbon risk exposure seem to be more politically visible and may be prone to stricter stakeholders' scrutiny (Al-Qahtani and Elgharbawy, 2020). Therefore, companies engage in higher voluntary disclosure to reduce the potential costs arising from the interaction between the company and its societal and natural environment (Beji et al., 2021; Biswas et al., 2018). It is challenging achieving an appropriate measure for carbon emission disclosure due to the lack of comparability and consistency of such practices and reporting across companies giving rise to challenges in developing a measure to properly assess management efforts in reducing carbon emissions (Ali and Shaik, 2022). We overcame this challenge by developing a comprehensive measure using the guidelines in International Sustainability Standard Board (ISSB) climate related disclosure checklist.

The documents specified information on peculiar features that represent the carbon emission disclosure quality. The features are classified into 5 categories as follows (1) climate change: Risk and opportunities (CC), (2) greenhouse gas emission (GHG), (3) energy consumption (EC), (4) reduction of greenhouse gas and cost (RC), and (5) accountability of carbon emissions. ISSB checklist also provides detail information on the specific information to disclose in each category. On the presumption that objective of carbon emission disclosure is to enable the general-purpose financial statement users make informed decision as to the governance processes, controls and procedures an entity uses to manage, monitor, and oversee climate-related risks and opportunities, the provision of independent assurance report either by an audit firm or non-audit firm is essential (Hollindale et al., 2019; Ararat and Sayedy, 2019).

We analyzed the research objective using data from the listed oil and gas companies in Nigeria since they are the dominant greenhouse

gas emitters globally and show higher commitment to pursuing companies and industrial actions in communicating environmental related information with the external stakeholders, that may reflect attitudinal changes and product sensitive innovations to reducing emission of carbon, carbon management, and targets. Similarly, these companies appear to have heterogenous shareholders with divergent information needs and vested interests (Handschumacher & Ceschinski, 2020; Hollindale et al., 2019; Hanifah, 2016). Using an ordered logistic regression analysis, we found several important results. First, the findings revealed that firms with greater proportion of foreign ownership exhibit higher carbon emissions disclosure quality, which suggest that the type of ownership correspond with firm's proactiveness and commitment to environmental practices in the selected companies.

Second, institutional ownership in negatively correlated with carbon emission disclosure quality, providing an implication that when institutions invest heavily in a company, they favor weak carbon related disclosure because it enables them to exploit minority shareholders. Third, we observed a negative correlation between ownership concentration and carbon emission disclosure, which indicates that controlling shareholders may be prone to monopolizing carbon emission information to maintain superiority in monitoring and decision-making process. The paper is organized into 5 sections. Section one presents introduction, section 2 presents the literature review while methodology adopted for the study was discussed in section 3. Results and discussion of findings were done in section4 while conclusion was presented in section 5.

2. LITERATURE REVIEW

2.1. Concentrated Ownership versus Diluted Ownership

From the perspective of agency theory, concentrated ownership is a component part of the internal corporate governance principles whereby investors with large shares in a firm are empowered to monitor firms' management and influence the company's decision-making process, while a significant increase in the diffusion of shareholding indicates a weak incentive of shareholders to monitor the managers (Ahmad et al, 2018; Ali, & Shaik 2022; Hassan et al, 2020). Recently, Oluwagbemiga (2021) conducts research in Nigeria and reported that management that is properly scrutinized by dominant stockholders are prompt to invest image building activities as investors with significant stakes have incentives to require the disclosure of large information about the firm's long-term objectives. However, a strand of literature observed a weak correlation between ownership concentration and carbon emission disclosure since more significant investment purchased by few shareholders seem to reduce the desire for transparency and public accountability. For instance, Alhassan and Islam (2021) reported a positive correlation between concentrated ownership concentration and carbon disclosure, which suggests that a company with higher concentrated ownership has the potential to increase carbon emission disclosure.

Therefore, it implies that companies with ownership concentration seem to be less incentivized to report higher information for influential investors with little consideration of other shareholders (principal – principal's conflict), thereby signaling inadequate information to the public (Al-Qahtani and Elgharbawy, 2020). Similarly, block holding ownership as a proxy for concentrated ownership is often used in some studies. For example, Ogungbade and Oyerogba (2020) found that block shareholders having more than 5 percent of the total outstanding shares can restrict the disclosure of information in public to sustain their information superiority, which is consistent with the findings of Oluwagbemiga (2021). In like manner, ownership concentration may reduce the quality of corporate social responsibility (CSR) disclosure due to the dominant effect of insufficient external supervision (Al-Qahtani and Elgharbawy, 2020). We therefore formulate a hypothesis as follows:

$H_1$1 Ownership concentration has no statistically significant influence on carbon emission disclosure quality.

2.2. Institutional Ownership

Institutional ownership has been defined as relevant dominant investors having a significant board presence of corporations. In certain nations (e.g United Kingdom), institutional ownership was rampant and significant during the twenty-first century, when the institutional investment's growth such as aggregate ownership of equity rose from 6.1% in 1950 to more than 50% in 2002 (Al-Qahtani and Elgharbawy, 2020). However, despite its prevalence, scholars investigating the relationship between institutional owners and carbon emission disclosure failrd to reach a definitive conclusion. Accordingly, from the viewpoint of agency theory, the institutional investors can be viewed as an important monitoring mechanism of corporate governance for reducing the information asymmetry between the agent and the principal since they often hold a significant proportion of equity, which enables them to participate in corporate voting, that influences how companies are managed and governed (Bebchuk et al., 2017; Oyerogba, 2018). Consequently, the managements can be under huge pressure from investors to disclose higher voluntary information, especially carbon emission related information (Ali and Fatima, 2023; Ararat and Sayedy, 2019).

According to Araissi et al. (2016), investors activism (especially the institutional shareholders) can elicit higher disclosure of companies' environmental issues and exposure to climate change risks. They observed also those institutional investors treasure transparency regarding a company's climate change risks exposure (Araissi et al., 2016). Similarly, Ogungbade and Oyerogba (2020) asserted that firms with a significantly huge percentage of institutional ownership may voluntarily disclose relevant carbon emission information since large shareholders are often very attentive to the company's decision and strategies than minority investors, that significantly influences management behavior and attitudes toward greener activities. Therefore, the effect of institutional investor fosters active oversight to curtail manager's opportunistic behaviors in form of greenwashing because of the enormous investment in the stock market (Aladwey et al., 2022). Hence, institutional ownership could promote carbon emission disclosure (Ali and Fatima, 2023, Hadya & Susanto, 2018).

In contrast, other scholars reported that institutional investors could discourage release of sensitive voluntary information to the

public to maximize their personal benefits at the expense of the remaining minority shareholder, and this may increase the agency conflict (Ali and Fatima, 2022; Adwally, 2015, , Glass et al., 2015). This occurs due to the institutional ability to retrieve information directly from the company and its managers, so they could have direct access to internal sources of information that may be unavailable to other stakeholders. Therefore, we hypothesize that:

$H_1$2 Institutional Ownership has no statistically significant influence on carbon emission disclosure quality.

2.3. Managerial Ownership

From the agency theory perspective, executive compensation (such as shares and stock) has been established as an effective corporate governance practice that aligns the interest of the principals (shareholders with that of the agents (managers). Therefore, managers may develop long-term interest in the firm and less incentive to expropriate minority investors (Adwally, 2015; Oyerogba et al., 2016). Managerial shareholding represents the proportion of equity belonging to the executives and management, that could minimize agency costs emanating from the divergence of interests between management, and other investors. Transferring part ownership to the management may achieve the alignment of interests since managements can be motivated to act more objectively when taking decisions about the entire shareholders' wealth and where they take the consequences (Daruwala, 2023). Moses et al. (2020) and Mohammed (2018) align with this argument as they observed a significant correlation between managerial ownership and environmental disclosures. However, from the viewpoint of Bektur and Arzova (2020), an entrenchment effect can occur when managerial equity is beyond a certain quota. Management can therefore be empowered to reduce corporate voluntary disclosure to prevent public scrutiny and retain their superior voting right for the protection of their personal benefits (Beji et al., 2021; Ben-Amar and Mcilkenny, 2014). In such instance, the agency problem appears to worsen since management with a significant vote and a concerted interest in controlling the firm could take a decision oriented to personal interest rather than the overall shareholders' interests (Ali and Fatima, 2022). For instance, Oyerogba and Ogungbade (2020) observed an inverse relationship between managerial ownership and carbon emission disclosure. Similarly, Beji et al. (2021) found a negative correlation between managerial ownership and sustainability reporting quality. As touching voluntary disclosure of environmental protection initiatives, Daruwala, (2023) and Chithambo and Tauringana (2014) empirically found negative correlation between managerial ownership and voluntary carbon emission disclosure. Therefore, we hypothesize that:

H_i3 Managerial Ownership has no statistically significant influence on carbon emission disclosure

3. METHODOLOGY

3.1. Population and Study Sample

The population for this study consists of the 24 oil and gas companies listed on the Nigeria Exchange Group (NEG) for a 15-year period from 2009 to 2023. Data for all the variables were collected from various sources such as Central Bank of Nigeria statistical bulletin, Stock Exchange Factbooks and audited financial statements of the companies. The final sample for the study is made up of balanced panel of 330 firm-year observations for 22 quoted oil and gas companies for the fifteen-year period. The details are presented in Table 1. As can be seen Table 1, two companies were eliminated from the 24 listed oil and gas companies which brings the sample to 22 companies. One company had qualified audit report while the second company does not have stand-alone sustainability report. Having a qualified audit report brings to question, the reliability of information coming from such a company, and this necessitated the exclusion of this company from the sample. Secondly, data for carbon emission disclosure were extracted from the stand-alone sustainability report. Therefore, it is difficult accessing data for a company without a stand-alone sustainability report.

3.2. Measurement of Carbon Emission Disclosure Quality (CEDQ)

To determine the CEDQ, we relied on information in the following documents:

(i) International sustainability standard board (ISSB) climate related disclosure checklist
(ii) Nigerian sustainable banking principles (NSBP) guidelines issued by Central Bank of Nigeria
(iii) Existing literature on carbon emission disclosure (Oluwagbemiga, 2021; Kanagaraj and Gouwsigan, 2021; Kumar, 2019; Baidoo, 2022).

The documents specify information on peculiar features that represent the carbon emission disclosure quality. The features are classified into 5 categories as follows (1) climate change: Risk and opportunities (CC), (2) greenhouse gas emission (GHG), (3) energy consumption (EC), (4) reduction of greenhouse gas and cost (RC), and (5) accountability of carbon emissions. ISSB checklist also provides detail information on the specific information to disclose in each category. On the presumption that objective of carbon emission disclosure is to enable the general-purpose financial statement users make informed decision as to the governance processes, controls and procedures an entity uses to manage, monitor, and oversee climate-related risks and opportunities, the provision of independent assurance report either by an audit firm or non-audit firm is essential (Hollindale et al., 2019; Ararat and Sayedy, 2019).

Following the literature on carbon emission disclosure (Kumar, 2019; Baidoo, 2022; Hollindale et al., 2019), we extracted categorical data based on the aforementioned criteria. A score of 1-7 was assigned for the measurement of CED quality. A CEDQ score of 1 implies that the company have adequate disclosure on only climate change: risk and opportunities and inadequate disclosure on other four categories, CEDQ score 2 implies adequate disclosure on the first two categories, CEDQ score 3 means the company have adequate disclosure on the first three categories, CEDQ score 4 implies that the company have adequate disclosure on the first four categories, CEDQ 5 implies that the company has adequate disclosure on all the five categories, CEDQ score 6 implies that the company have adequate disclosure on all

the 5 categories with assurance report from a non-audit company while CEDQ score 7 means that the company have adequate disclosure on all the 5 categories with assurance report from an audit company.

This scale was applied in measuring the quality of carbon emissions reduction activities of the selected companies reported in their stand-alone sustainability reports. The details of the measurement scales can be seen in Table 2. In addition to the base line analysis, we conducted some sensitivity analysis in this study.

First, we deployed two alternative scales for measuring the CEDQ using a dichotomous variable. In this regard, the level of assurance was ascertained based on whether verification of the sustainability report was done by an audit firm. Second, we computed Two-Steps System GMM estimation approach due to several advantages it has over the ordered and binary logistic regression.

3.3. Estimation Model

Considering the SRQ indices used in this study, it is important to state that using OLS for a variable with binary or categorical data- may produce a linear probability model. However, the errors (residuals) arising from such a linear probability model undermine the normality and homoscedasticity assumptions, which are basic assumptions of classical OLS regression. This eventually produces invalid standard errors and spurious regression estimates (Ogungba and Oyerogba, 2020). Consistent with Amoa-Gyarteng (2021), we adopted an ordered logistic regression model to ascertain the influence of ownership structure on carbon emission disclosure of the Nigerian oil and gas companies. Seven-point scale was adopted in evaluating CEDQ (i.e. Poor, Low, fair, moderate, good, high, and excellent.), which indicates the CEDQ level.

The dependent variable for the equation is CEDQ molded as a function of the board ownership structure proxies among a set of firm-specific control variables drawn in line with the existing literature. The details of these variables are presented in Table 3. To determine the influence of ownership structure on CEDQ, we used the following equation.

$$CEDQ = \beta_0 + \beta_1 COWN_{it} + \beta_{2it} DOWN + \beta_3 INOWN_{it} + \beta_4 MOWN_{it} + \beta_5 FOWN_{it} + \beta_6 SOWN_{it} + \beta_7 PROF_{it} + \beta_8 AQUA_{it} + \beta_{9it} + \beta_{10} FGRW_{it} + \varepsilon_{it} \quad (i)$$

where CEDQ represents carbon emission disclosure quality of firm i at time t; COWN is the concentrated ownership, DOWN is diluted ownership, INOWN is institutional ownership, MOWN is managerial ownership, FOWN is foreign ownership, SOWN state ownership, ROCE is return on capital employed, FGRW represents firm growth, CGEAR is capital gearing, and AQUA denotes audit quality.

Table 1: Population and sample size for the study

Sample Frame	Number of companies	Number of firm year observations	% of the target population
Listed oil and gas as at end of 2023	24	360	100
Less: firm with qualified audit Rep	(1)	(15)	(4.2)
Less: firm without sustainability Rep	(1)	(15)	(4.2)
Listed oil and gas company in final sample	22	330	91.6

Table 2: Measurement of carbon emission disclosure quality

Score	Measurement	Interpretation	Results
1	There is adequate disclosure of CC only	CC-1 Assessment and description of risks related to climate change and the actions taken to mitigate these risks. CC-2 Current and future assessment and description of the finance, business and opportunity implications of climate change	Poor
2	There is adequate disclosure on CC and GHG only	GHG1 Disclosure on methodology for calculation GHG2 Disclosure on external verification GHG3 Disclosure on total emissions GHG4 Disclosure by scope GHG5 Disclosure by source GHG6 Disclosure by segment or facility GHG7 Historical comparison of emission	Low
3	There is adequate disclosure on CC, GHG and EC only	EC1 Disclosure on total energy consumed EC2 Disclosure on consumption from renewable source EC3 Disclosure by segment, type, and facility	Fair
4	There is adequate disclosure on CC, GHG, EC and RC only	RC1 Disclosure on plans to reduce GHG emissions RC2 Disclosure on targets for GHG emissions RC3 Disclosure on reduction of GHG achieved to date RC4 Disclosure of costs of future emissions factored in capital budgeting	Moderate
5	There is adequate disclosure on CC, GHG, EC, RC and AEC	AEC1 Report provides explanation of where responsibility lies for climate change policy and action AEC2 Report provides information on mechanism by which board reviews company progress on climate change actions.	Good
6	There is adequate disclosure on CC, GHG, EC, RC and AEC	A non-audit firm provided assurance on carbon emission disclosure	High
7	There is adequate disclosure on CC, GHG, EC, RC and AEC	An audit firm provided assurance on carbon emission disclosure	Excellent

4. RESULTS AND DISCUSSION

4.1. Descriptive Statistics

Table 4 presents the summary statistics for the study variables. The table is arranged into three panels. Panel A presents the percentage and frequency distribution for carbon emission disclosure quality for all the seven categories. Panel B presents the percentage and frequency distribution for the binary data used in measuring the level of assurance on the sustainability report while panel C presents the mean, standard deviation, observation, minimum and maximum values for all variables.

As can be seen in Panel A, a larger percentage of oil and gas companies in Nigeria have intensified efforts towards conducting their businesses in an environmentally friendly manner, resulting in high level of carbon emission disclosure in their annual reports. For instance, 51(15.5%) of the firms produced a low carbon emission disclosure quality, indicating that the companies engaged in just 2 aspects of the 5 component parts of the carbon emission reduction activities. Similarly, 39 (11.8%) of the firms in our sample obtained a fair carbon emission disclosure quality which suggest that those companies engage only in climate change: risk and opportunities assessment and mitigation and greenhouse gas emission control only while the remaining 2 carbon emission reduction activities were neglected. We equally reported that 80 (24.2%) of the companies had strong commitment to 4 aspects of carbon emission disclosure in the audited financial statements while 59 (17.9%) of the companied show full commitment to all the whole activities that make up the carbon emission reduction in accordance with the guidelines by the International Sustainability Standard Boards (ISSB). Concerning the level of assurance, 74 (73.3%) had their carbon emission disclosure report reviewed by a non-audit firm while an audit firm provided assurance on carbon emission disclore report from the remaining 27 (26.7%).

Panel C presents the summary statistics for the independent and control variables. As can be seen in panel C, concentrated ownership produced a mean value of 12.7, within a range of 5.13 and 15.9. The result implies that on the average, the percentage of equity owner by the dominant shareholders is about 12% which is slightly higher than the 10% recommended by the SEC code of corporate governance. We a mean of approximately 76%

Table 3: Variable measurement and definitions

Variable type	Definition	Measurement
Dependent variable		
CEDQ	Carbon emission disclosure quality	Measured using a scale of 1-7
Independent variable		
COWN	Concentrated ownership	Total number of directors
DOWN	Diluted ownership	% of non-executive directors
INOWN	Institutional ownership	% of share held by institutional investors
MOWN	Managerial ownership	% of share held by executive directors
FOWN	Foreign ownership	% of share held by foreign investors
SOWN	State ownership	% of share held by government
Control variables		
PROF	Return on capital employed	PBIT/CE
FGRW	Firm growth	% change in sales revenue
CGEAR	Firm gearing ratio	Debt/Equity ratio
AQUA	Audit quality	1 if audit by big, 0 if otherwise

Table 4: Descriptive statistics results

Scale	1	2	3	4	5	6	7
Panel A: Frequency and percentage for carbon emission disclosure using categorical data							
CEDQ	-	51 (15.5%)	39 (11.8%)	80 (24.2%)	59 (17.9%)	4 (22.4%)	27 (8.2%)
Panel B: Binary data							
Assurance	74 (73.3%)			27 (26.7%)			
Panel C: All variables							
Variable		**Mean**	**Min**	**Max**	**SD**	**OBS**	
Dependent							
CEDQ		3.79	1.00	7.00	1.08	330	
Assurance		6.22	6.00	7.00	0.36	101	
Independent variables							
Concentrated ownership		12.7	5.13	15.9	1.03	330	
Diluted ownership		75.2	69.2	88.7	6.82	330	
Institutional ownership		8.41	6.59	37.5	2.28	330	
Managerial ownership		17.9	15.3	27.0	3.15	330	
Foreign ownership		15.4	11.8	25.0	5.07	330	
State ownership		9.25	4.89	19.4	3.26	330	
Control variables							
ROCE		14.27	11.18	25.96	1.55	330	
FGRW		20.88	17.75	25.25	0.92	330	
CGEAR		0.17	0.14	0.26	0.11	330	
AQUA		0.89	0.00	1.00	0.07	330	

for diluted ownership, and the result suggest that about 76% of the total equity of the oil and gas companies are owned by the general populace, indicating that this sector seems to be free from the influence of a few overbearing investors. The percentage of diluted ownership reported in this study is significantly higher that the 61% reported by Oyerogba and Ogungbade (2020) reported for the listed companies in Nigeria and is slightly higher than the minimum threshold of 75% recommended for the listed companies in Nigeria. The reported mean for diluted ownership attained by the oil companies in Nigeria is equally higher than 68.4% reported by Ali (2022) for the listed firms in India, 71.2% for listed companies in Ghana (Baidoo, 2022), and 73% for listed firms in China (Kumar, 2019).

Institutional investment in the oil and gas industry ranges from 12.9% to 17.5% with an average of 14.4%. In our sample, only two companies have more than the allowable 15% for institutional ownership. Similarly, all the companies in our sample have managerial ownership. However, no threat is foreseen as their stake is within the regulatory threshold since managerial ownership makes up about 8% of the total equity. Foreign investors make up about 15% of the total investment in the oil sector in Nigeria. They are a mainstay of best practices. Their presence on the board forms a balance with other directors to ensure that the company's business is conducted in an environmentally friendly manner and equally ensure that no stakeholder group is marginalized through adequate disclosure. Only 7 companies in our sample have state ownership, accounting for about 6% of their total equity. Their absence does not constitute a threat to the survival of the company so far oversight functions are carried out through the regulatory agencies. In fact, their presence has been found to weaken oversight function in circumstances where state had to prioritize return on their investment above economic growth (Ogungbade and Oyerogba, 2020).

For the control variables, the mean for ROCE is about 14% which implies that the companies in our sample are in a good financial position. Informatively, only one company reported a ROCE of 11% that is below the industry average in 1 year. The companies also exhibited about 20% growth rate during the year under consideration, which is about the highest in the developing economies, higher than the 12% reported for listed companies in Ghane (Baidoo, 2022), 14% for Kenya listed manufacturing firms (Oyerogba, et al., 2024) and Tehran stock exchange (Ghafoorifard et al., 2014). For capital gearing, the result show that companies in our sample demonstrate a relatively high liquidity as the debt-to-equity ratio is about 17% which far below the threshold of 25% recommended for the industry (Oluwagbemiga, 2021). About 89% of the companies are being audited by the Big 4audit firms.

4.2. Estimation Results

Table 5 presents the results of ordered logistic regression analysis. As shown below, Table 5 contains seven columns. Results for the base line regression comprising the whole data appear in Column 1. In this regression, all variables are tested simultaneously using the complete data set for all the companies. Interpretation of the results in column 1 may be done from the signs of the beta coefficient based on the type of regression model adopted for the study and nature of the data extracted for this analysis. The results of differential equation representing the marginal effect of the categorical data are presented in column 2-7 and this enables the results interpretation using the marginal effects at the mean and signs of the coefficients, which suggests the likelihood that disclosure of carbon emission may be of lesser or greater quality in line with the ownership structure and firm specific control variables.

In Column 1, the results show that CEDQ has a positive correlated with all the proxies for ownership structure, with the exemption of concentrated and institutional ownership. Hence the study established that oil and gas company with diluted ownership, higher proportion of foreign investors, greater managerial and state ownership are very likely to devote resources to reduction of carbon emission which may result in higher carbon emission disclosure. On the other hand, the result indicates that firms with extremely large institutional and concentrated ownership are very unlikely to commit the company's resources to environmental protection activities such as carbon emission reduction and as such are less likely to have adequate carbon emission disclosure in their financial statements and annual report.

Specifically, the result shows that carbon emission disclosure worsen with an increase in ownership concentration. This is not surprising given that the dominant shareholders discourage the release of sensitive voluntary information to the public for maximization of their private benefits at the expense of the remaining stakeholders and this promotes agency conflict (Oluwagbemiga, 2021; Oyerogba and Ogungbade, 2020; Ogungbade and Oyerogba, 2020). This is because the voting right of the dominant investors put them in a position to obtain information directly from the firm and its management, resulting into a lower level of interest in voluntary disclosure. Another important dimension is that the board oversight functions is weakened where there are dominant investors on the board, and this may affect the volume of voluntary disclosure of sensitive information such as carbon emission disclosure.

The diluted ownership is positively correlated with the aggregate carbon emission disclosure quality and the coefficient estimate is robust for all the categories of carbon emission disclosure (low to excellent). The coefficient of diluted ownership increases in absolute figure from 0.169 in the base line regression to 0.407 in the differential equation measuring the marginal effects and elasticity of the carbon emission disclosure. This result underscore the importance of diluted ownership as an instrument to influence the firm's decision-making process and mirrors the findings of Oyerogba (2018).

We observed a negative relationship between institutional ownership and carbon emission disclosure quality. This negative relationship remains strong across all the categories of carbon emission disclosure and significantly related at over 99% confidence level from good to excellent categories. The proper explanation for the inverse relationship may be attributed to the interest shifting focus of institutional shareholders. Alhassan

Table 5: Ordered logistic regression for ownership structure and CEDQ

Variables	Baseline	Categorical data for marginal effects					
		Low	Fair	Moderate	Good	High	Excellent
COWN	−0.275**	−0.174**	−0.312**	−0.478**	−0.269**	−0.274**	−0.367**
DOWN	0.169**	0.244**	0.393**	0.377**	0.384**	0.395**	0.407**
IOWN	−0.284**	−0.391**	−0.286**	−0.328**	−0.337***	−0.365***	−0.416***
MOWN	0.276**	0.729**	0.628**	0.643**	0.522**	0.564**	0.581**
FOWN	0.215**	0.118*	0.172**	0.203**	0.208**	0.226**	0.255**
SOWN	0.007	0.042	0.057	0.059**	0.061**	0.075**	0.183**
PROF	0.298**	0.209***	0.211***	0.207**	0.220***	0.234**	0.247**
FGRW	0.116**	0.821**	0.825**	0.841**	−0.843***	−0.838**	−0.704**
AQUA	0.221	0.197	0.201	0.236	0.239**	0.241**	0.239
CGEAR	−0.618**	−1.085	−2.085**	−2.217**	−1.944**	−2.116**	−2.252**

and Islam (2021), posited that institutional investors seem to have short-run investment horizons due to enormous pressure to deliver returns to their constituents regularly. Also, institutions are largely short-term, placing higher premium on short-term financial gain rather than the long-term value of corporate social and environmental investment.

For managerial ownership, we observed that integrating the management into the ownership of the oil and gas companies helps in improving the level of carbon emission disclosure, which can be justified that management who are part owner will be quick to disclose more voluntary information on their commitment to environmental protection in form of carbon emission disclosure as it may help sell the company to the global market. The result aligns with many of the existing literature (Hollindale et al., 2019; Kumar, 2019; Baidoo, 2022)

As touching the influence of foreign ownership on carbon emission disclosure quality, we find a consistent results across all models, that foreign ownership has significantly positive influence on carbon emission disclosure quality. The possible explanation for this result is that foreign institutional investors can use superior ability and knowledge combine with a greater incentive to compel directors, management and other people involved in corporate reporting to enhance information disclosure. However, caution can be taking in estimating the role of foreign ownership because foreign investors can become very powerful to pursue their own self-seeking interest, that may not align with the interest of other investors or stakeholders.

Furthermore, we report that state ownership has a positive relationship with all categories of carbon emission disclosure, but significant at the moderate to excellent level of disclosure, suggesting that a higher proportion of government stake in oil and gas companies induces management's environmental proactiveness which ultimately increase voluntary disclosure of carbon emission information. This result can be explained in the light of political cost theory which predicts that government investment comes with serious expectations towards corporate environmental proactivity than other types of ownership (Oluwagbemiga, 2021; Putranti & Imansyah, 2017). Therefore, consistent with the political cost theory (Ogungbade and Oyerogba, 2020), management appears concerned with political considerations. Hence, they could decide to engage in higher disclosure of carbon emission related information to reduce the potential political costs that may arise from the interplay between companies and their societal and natural environment (Aliyu, 2019; Hamad et al., 2020; Mahmood et al., 2018).

To ensure robustness of the analysis, we included certain firm specific variables (profitability, firm growth, audit quality and capital gearing) on the presumption that these firm specific variables may be endogenously determines by the structure and types of ownership. As can be seen in Table 5, we find that profitable (high return on capital employed) oil and gas companies have higher likelihood of quality disclosure on carbon emission. This result is not unexpected as it is reasonable to believe that profitable companies will be prone to revealing their activities to the public in other to attract more patronage. We also document a significant relationship between firm growth and carbon emission disclosure quality. This result is consistent across all categories of carbon emission disclosure quality and mirrors the findings of Aliyu (2019) and Rupley et al., (2012). For audit quality, our findings establish that a significant relationship exists between audit quality and medium, good, and high carbon emission disclosure quality, and the result is consistent with Oyerogba et al (2024). Lastly, we report an inverse relationship between the liquidity variable (capital gearing) and carbon emission disclosure, which implies that firms with higher proportion of debt in their capital structure are less likely to commit adequate resources to carbon emission reduction activities probably because of the need to prioritize loan repayment and interest on loan over other responsibilities.

5. SENSITIVITY ANALYSIS

Assurance Level: External verification has been established in previous studies as an important mechanism to enhance the credibility and reliability of information disclosed in the audited financial statements. Consistent with Oluwagbemiga (2021), we ascertained the assurance level based on whether carbon emission disclosure was reviewed by either an audit or non-audit firm. Based on the nature of the data (dummy of 1 and 0), we conducted binary logistic regression using a dichotomous variable. The findings presented in Table 6 are consistent with previous results except that the coefficient for board size shows a significant positive relationship for both audit and non-audit assurance. The result implies that board size influences the carbon emission disclosures quality through external verification. However, it does not matter whether verification is done by audit or non-audit firm. What is important is that carbon emission disclosure of the oil and gas

Table 6: Binary logistic regression for ownership structure and CEDQ

Variables	Baseline	Assurance level	
		Audit	Non-Audit
COWN	−0.275**	0.162**	0.173**
DOWN	0.169**	0.255**	0.281**
IOWN	−0.284**	0.547***	0.392**
MOWN	0.276**	0.118**	0.175**
FOWN	0.215***	0.286***	0.605**
SOWN	0.007***	−0.315**	0.289**
PROF	0.298**	0.228**	0.194**
FGRW	0.116**	0.357**	0.277**
AQUA	0.221	0.326**	0.208**
CGEAR	−0.618**	−1.008**	−2.521**

companies should be verified by an external body to increase the credibility of these disclosures.

In addition, audit quality is significantly correlated with approximately 17% increase in carbon emission disclosure quality through external assurance by an audit firm, and about 19% increase in carbon emission disclosure through external assurance by a non-audit firm and this is consistent with many of the previous findings (Akhiroh & Kiswanto, 2016; Ali., 2020; Al-Matari., 2022; Al-Shaer & Zaman, 2016; Amoako et al., 2017). All other results are as previously reported.

6. CONCLUSION AND RECOMMENDATIONS

This study investigates how and the extent to which different forms of ownership (foreign, managerial, diluted, concentrated and institutional) influences carbon emission disclosure quality as shown in the levels of the voluntary carbon emission related disclosures in the stand-alone sustainability report of the listed oil and gas companies in Nigeria. Hence, we complement the three leading streams of research on the determinants of carbon emission disclosure quality.

We analyzed the research objective using data from the listed oil and gas companies in Nigeria since they are the dominant greenhouse gas emitters globally and show higher commitment to pursuing companies and industrial actions in communicating environmental related information with the external stakeholders, that may reflect attitudinal changes and product sensitive innovations to reducing emission of carbon, carbon management, and targets. Similarly, these companies appear to have heterogenous shareholders with divergent information needs and vested interests (Hollindale et al., 2019). Using an ordered logistic regression analysis, we found several important results. First, the findings revealed that firms with greater proportion of foreign ownership exhibit higher carbon emissions disclosure quality, which suggest that the type of ownership correspond with firm's proactiveness and commitment to environmental practices in the selected companies.

Second, institutional ownership in negatively correlated with carbon emission disclosure quality, providing an implication that when institutions invest heavily in a company, they favor weak carbon related disclosure because it enables them to exploit minority shareholders. Third, we observed a negative correlation between ownership concentration and carbon emission disclosure, which indicates that controlling shareholders in form of institutional ownership may be prone to monopolizing carbon emission information to maintain superiority in monitoring and decision-making process.

For a robustness check, we included certain firm specific variables (profitability, firm growth, audit quality and capital gearing) on the presumption that these firm specific variables may be endogenously determines by the structure and types of ownership. Our findings shows that profitable (high return on capital employed) oil and gas companies have higher likelihood of quality disclosure on carbon emission as well as growing companies and those audited by the Big4s. This result is not unexpected as it is reasonable to believe that profitable companies will be prone to revealing their activities to the public in other to attract more patronage. Lastly, we report an inverse relationship between the liquidity variable (capital gearing) and carbon emission disclosure, which implies that firms with higher proportion of debt in their capital structure are less likely to commit adequate resources to carbon emission reduction activities probably because of the need to prioritize loan repayment and interest on loan over other responsibilities.

This study offers useful recommendations and important implications for relevant stakeholder at a different stage. First, the board and statutory committees involved in provision of oversight functions and strategic decision-making process are expected to identify important shareholders willing to foster corporate proactivity on carbon emission disclosure. Therefore, this study can be a springboard to equip them with the basic knowledge about the roles of different investors in promoting carbon emission disclosure. Second, the policymakers and regulators can prevent firm management from acquiring a significant percentage of equity to minimize its negative impact on carbon emission disclosure.

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