Economic drivers of firms' purpose driven choice of climate change disclosures: evidence from listed Nigerian firms.

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ABSTRACT

The extreme impact of climate change in developing countries may cause business managers to withhold climate information. This paper examines the economic drivers of firms' goal-driven choice of 'climate change disclosure quality' backed by legitimacy, signaling, stakeholder, and voluntary disclosure theories.

We consider firms' level of climate change disclosure choices by testing the association of ownership structure with economic drivers of climate change reporting. We adopt logistic regression model and our result show that climate change disclosure is linked to business ownership structure.

Our findings suggest that firms with a higher level of withholding information are likely to choose 'high-quality climate disclosures' rather than 'low-quality disclosures'.

Keywords: **'**Climate change disclosure', Transparency, 'Legitimacy theory', 'Voluntary disclosure theory', 'Signaling theory', 'Business ownership structure', Nigeria

1. Introduction

The effect of global warming is climate change which disrupts the general weather patterns and the balance of nature (Pour et al., 2020: Wang et al., 2014).The two major considerations that are significant for climate change responses are '**mitigation'** and '**adaptation'**. Whilst the adaptation to climate change is referred to as a form of natural system of adjustment to climate impact which lessens the danger and takes advantage of the available beneficial opportunities (IPCC, 2007), climate change mitigation involves the implementation of policies for the reduction of carbon emissions (UN HABITAT: IPCC, 2007).The mitigation is also seen as the human intervention to reduce the sources of carbon emissions (UN HABITAT: UNFCCC,

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1997) to achieve the decarbonization goal, and this require corporations to embrace environmental disclosures on the amount of carbon emitted during their industrial activities which has a negative effect on the climate (Solikhah et al., 2020) (Vastrelli et al., 2024).However, many firms are keener about the cost and benefits of reporting climate activities of their company (Cornier & Magnam, 1999). Regulatory bodies and initiatives i.e. the 'Global Reporting Initiatives' (GRI), 'Carbon Disclosure Project' now known as 'CDP', 'Task Force on Climate-related Financial Disclosure' (TCFD), 'Greenhouse gas (GHG)' protocol, institutional regulators, stakeholders (Lakhiani &Herbert, 2022 :IFRS Foundation 2021; Impact Management Project, World Economic Forum & Deloitte 2020) and equity investors are shedding more lights of encouragement on corporations to strengthen their efforts toward climate performance and are demanding a more transparent climate change disclosures (Fedorova &Martynova, 2021). Many big corporations have leveraged on climate related disclosures to improve their market share and have combined the reports such that it benefit the bottom line of their organizations even though many of the reports lack transparency, accuracy, completeness and truthfulness of environmental concern (Kalu J.U et al.,2016) (Sun& Shi, 2022). More so, despite corporation's awareness and compliance to publish their climate activities; equity investors still experience financial losses that is relatively linked to climate risks ; for example the climate–risk related financial losses in the case of 'bankruptcies in the US coal industry', the fall of the share value for the 'California utility PG&E' (Griffin &Jaffe,2022) (Kalu J.U et al., 2016) as a result of incomprehensive disclosures and inaccuracies of environmental reports which are part of the leading effects of climate change that continues to linger on in different continents of the world with sub-Saharan Africa as the worst hit continent in all (Czechowski,2020) (Jedwab et al., 2023) (Sasu, 2023).

This study will not lay more emphasis on the importance of climate change disclosure but it will focus on examining the economic drivers that determines the purpose driven choice of climate change disclosures in sub-Saharan Africa. Prior literatures have addressed the determinants of climate disclosure ; Cormier & Magnan (1999), Amran et al.,(2011), Amran et al.,(2014), Kalu et.al., (2016), Halkos&Skouloudis,(2016),Baalouch et al.,(2019),Caby et al.,(2020), Desai,(2022), Mou Ruiqin & Ma Tao (2023), Vithanage &Shamil,(2022), Mehedi et al.,(2023),both in financial institutions and non-financial firms ; they have maintained the position that size, profitability, leverage, market value ,strategy and vision, diversity in boards including board size, dual listing, and environmental performance are major determinants of carbon disclosures quality for firms. However, some of the studies regarding the economic determinants of climate change disclosures present results that were not conclusive; most of the

studies lack endogeneity and experiences measurement error problems, making it difficult to interpret the findings (Healy &Pelepu, 2001). Although climate change disclosures is still on its journey to fully mature and imbibe the required standards of reporting with consistency, accuracy and comparability as it is obtained in financial reports which follows the required rigorous standards of accuracy, consistencies and comparability; prior studies have not fully explored the impact of business ownership structures on environmental disclosures to stakeholders (Achenbach, 2021).

Furthermore, Calza et al., (2016), explored the association between various firms' 'ownership structures' and their pro-active environmental performance, to examine if certain types of shareholders act as a reviving factor for firms' environmental activities. Nguyen et al., (2024), revealed what determines the disclosure of carbon emissions by examining the 'influence' level of different categories of 'ownership structure' on climate related disclosures but did not fully explore all the categories of business structure. The categories of business ownership considered includes; 'long term and short term institutional' owned businesses, 'managerial' owned businesses, 'block holders', and government ownership. Md Zaini et al., (2020) considered family owned businesses in Malaysia but did not explore all the other categories of corporate ownership structure. Wei et al., (2024) present the impact of business ownership structure (with emphasis on institutional owned business, state owned and managerial owned business) on environmental disclosure in China. Prior studies on the various effects of business ownership structure (the managerial, institutional and foreign owned businesses) on environmental disclosures in emerging economies has produced mixed results (see Wei et al., 2024).More so, there is limited research study on the 'impact of family owned business structure and foreign owned firms on the choice of climate related disclosure in sub-Saharan Africa' (Razaq et al., 2023) (Munisi, 2023). This work aims to fill this gap by testing the association of business ownership structure on the economic drivers of firms' choice of climate change disclosures quality with focus on family owned businesses and foreign owned companies that are listed on Nigeria stock exchange market. It suggest possible roadmap to achieving a more accurate and reliable climate reports; it addresses three main questions; what are the economic drivers of firm's choice of 'climate change disclosures'? What is the effect of transparency on the choice of 'climate change disclosures'? How can regulatory institutions achieve a more reliable, consistent and accurate climate change reporting from corporations?

Firm's choice of climate change disclosure quality is backed by 'legitimacy theory', 'signaling theory', 'stakeholder theory' and 'voluntary disclosure theory'. This study contributes to literature by closing the existing research gaps of the economic drivers of firms' choice of climate disclosure levels. It confirm the empirical findings of existing studies regarding the factors that determines the choice of environmental disclosures, and we also test the association of business ownership structure on climate change reporting by adopting Logistic Regression Model. Our findings affirm that climate change disclosure is linked to corporate ownership structure. It indicate that family controlled businesses and foreign owned businesses have negative correlation on the choice of climate change disclosure. This implies that the ownership of a firm have the capacity to influence its management on what extent they approve the reporting of climate information. For firms to achieve a more reliable and accurate climate change disclosures; this work suggest the adoption of blockchain enabled reporting framework by regulatory institutions to improve investors' decision making processes.

This research study involves large multinational companies in the manufacturing, chemical, consumer goods and petroleum industries, including non-financial indigenous companies that are listed on the Nigeria Stock Exchange Market contributing significant amount of carbon emissions to the country. Multinational companies are selected due to their presence in major countries of the world and are usually adopted by researchers for the purpose of validation and expansion of existing theories (Roth&Kostova, 2003).This study will be beneficial to the emerging economies in sub-Saharan Africa and globally in the aspect of transparency in firms' climate risk disclosures through the following ways: it will reduce corruption by ensuring that companies are held accountable in the management of their environmental activities; it will restore confidence in the Stock Exchange market; and it will bring new opportunities for innovations in businesses by developing possible solutions to reducing the 'environmental impact of their operations'. This study will be helpful to both developed and emerging economies; it presents an important practical implications for investors, regulators, and policy makers that withholding climate change information does not necessarily link to low climate disclosure quality. Generalizations may be applicable regarding this research findings since the multinational companies represented in the sample have their presence in other countries of different continents but with diverse yet similar organizational cultures.

This study has some limitations however; the sample selection is only focused on Nigeria economy although most of the sample firms are multinationals with their presence in different

countries of the world where generalizations of research findings may be applicable. More so, the data was manually collected from annual reports and sustainability reports of the sample firms based on the climate disclosure guide that was solely focused on TCFD reporting framework to determine the emission score for each selected company. The remainder of this paper is arranged as thus; the next section present the contextual background on the frameworks for 'climate change disclosure' and metrics; it emphasize the importance of accuracy of 'climate change disclosures' alongside the effects of climate risks on firms' portfolios. The literature review the theories underpinning climate change disclosures; further section discusses the methodology, statistical analysis, empirical findings and discussion of the research gap including anticipated contributions to literature and we conclude.

2. Background, Literature Review

Climate change disclosure is a risk management tool and a template that organizations have to use to decide on the allocation of resources and human capital development (Cline 2020) (Kotsantonis et al., 2016).The analysis of investment portfolio of an organization is incomplete without the integration of climate reporting, this will determine its attractiveness to access private equity.

Investors are now considering not only the financial criteria of investment analysis, but are keen about the non-financials as well (Seker &Sengur, 2021) (Atan et al., 2016: Crifo&Forget, 2013).Furthermore, companies that do not acknowledge climate change issues has more tendencies to experience bad performance due to lack of access to private equity (Atan et al., 2016: Crifo &Forget 2013).

2.1 *Frameworks, Standards and Protocols for Climate Change Disclosure*.

The widely used reporting 'frameworks' are the 'SASB-Sustainability Accounting Standard Board', 'TCFD-Task Force for Climate Related Financial Disclosure', 'GRI-Global Reporting Initiative', 'UN.SDGs –United Nations Sustainable Development Goals', 'CDSB- Climate Disclosure Standard Board, Climate Disclosure Project', and 'IR –Integrated Reporting' (Dye et al., 2021)(Global Reporting Initiative,2023) (TCFD Handbook 2021) (CDP Climate Change 2022 Reporting Guidance, 2022),(Gahramanova & Furtuna,2023) (Luo et al.,2012) (Integrated reporting 2012) (Cheng et al., 2014).The 'International Accounting Standard Board (IASB)' and 'International Sustainability Standard Board (ISSB)' are regulated under the independent foundation known as the 'International Financial Reporting' Standard '(IFRS) foundation'. The

ISSB incepted two latest reporting standards; 'IFRS S1' and 'IFRS S2' in June 2023 (IFRS Sustainability, 2023) (ISSB in depth, 2023).Furthermore, the 'Corporate Sustainability Reporting Directive (CSRD)' is also a recent disclosure standard established for European businesses todisclose environmental related information regarding risks and opportunities and the impact of their business operations on the environment (Fasan,2024).

2.1.1 *Climate change disclosure metrics*

The metrics and targets for climate disclosures are an integral element in communicating a company's transition plan regarding climate information and tracking the progress of its strategies(Peixoto et al.,2023) (TCFD 2021).It requires that organization should disclose their 'Scope 1', 'Scope 2' and if necessary 'Scope 3'emissions. The '**Scope 1 Emissions'** are emissions that emanates from the organization's financially controlled operations which is referred to as the carbon-dioxide equivalents. '**Scope 2 Emissions'** are indirect emissions that are generated from 'purchased electricity' that is consumed by operations owned or controlled by the organization which is also described as the sources of primary emissions and '**Scope 3 Emissions'**; are generated from the value chain of the organization as a result of business activities which is an estimate of material for example; emissions from transportation etc. (TCFD, 2022) (Latham&Watkins, 2022).

2.2 *Business Ownership Structure and Transparency in Climate Change Disclosures*

The extreme impact of climate change in developing countries may cause business managers to withhold information which could result in manipulated financial results and climate risk disclosures (Khalifa et al., 2023). **Firms' ownership structure** influences its management on what extent they approve the disclosure of climate information. The reasons are not far-fetched; most of the shareholders consider their own interest before that of the stakeholders. Many businesses that are **family controlled firms** tend to minimally put pressure on managers to publicly present information concerning their environmental related activities because it is voluntary and most of the information is readily available to the shareholders (Wei et al., 2024).Furthermore, the lack of consistency and comparability in environmental disclosures will prevent stakeholders from assessing the effect of emissions on the financial future processes and the prospect of the company (Gahramanova& Kutlu ,2023).Whilst **Government** is perceived as important stakeholder for business with the capability to improve corporate strategy and overall performance of an organization, **Institutional owned** businesses are more experienced and sophisticated concerning access to information on firms' activities compare to

other shareholders (Acar et al.,2021). However, transparency is one of the major determinants of a firm's attractiveness to investors and the level of reliability and comparability in voluntary disclosures depends on manager's willingness to correct any form of deviations from actual information that is useful for capital market participants whose activities depends solely on clarity in disclosures (Mohammadi & Nezhad ,2015).In promoting transparency, accuracy and reliability in financial disclosures; Khalifa et al., (2023) posit that "accounting conservatism" could help in improving the quality of financial reporting however, this form of conservatism may be extended towards 'non-financial' disclosures concerning climate risks . Furthermore, linking both financial and non-financial disclosures in an integrated fashion will result in an improved assessment of an organization's performance and impacting the quality of information being reported to equity investors. This form of reporting serves as an instrument to enhance the decision making processes regarding resource allocation (Tlili et al., 2019: Eccles et al, 2010).More so, the higher the level of disclosure in terms of accuracy, transparency and reliability in the annual reports/sustainability reports/CSR reports, the higher the stock market liquidity and improved forecast accuracy (Akrout&Ben-Othman, 2016) (Muslu et al., 2019). An **enterprise size** affects the quality of climate disclosures (Eleftheriadis & Anagnostopoulou, 2014). Furthermore, a company's financial performance (**Profitability**) has significant association with voluntary climate change disclosures (Sobhy&Megeid, 2004: Nikolaou et al., 2015),

2.3 *Theories Underpinning Climate Change Disclosures; A Literature Review*

The explanations of these theories in organizational disclosure practices suits or may overlap one another (Lakhani & Herbert 2022: Haji &Anifowose, 2016) (Lakhani & Herbert 2022: Fuhrmann, 2020).The theories underpinning climate change disclosures are explained as follows; **'Legitimacy theory'** enables clear disclosures regarding a company's environmental activities. It explains the reasons behind the increase of these environmental disclosures in the annual reports of many companies (Mousa & Hassan, 2015). **The 'stakeholder's theory'** placed emphasis on the survival of an organization which is also intertwined with legitimacy theory. It suggests that for an organization to survive and thrive, it must be able to effectively manage the dealings with various stakeholders alongside their different expectations (Lakhani &Herbert, 2022: Chen& Roberts, 2010) (Haque & Islam, 2015) (de Grosbois& Fennell, 2022). However, Dye et al., (2021) posit that the stakeholder theory affirms climate disclosure as a communication tool rather than a reflection of true performance of organizations**. 'Voluntary disclosure theory'** declare that organizations have motivation to report their beneficial news in order to alleviate an unfavorable preference by the stakeholders (Park et al., 2023: Verrenchia, 1983).Managers will likely provide additional information when the benefits to the

organization outweighs the cost (Cornier &Magnam, 1999),(Rouf &Siddique ,2023).(Guo et al.,2022:Verrenchia ,1983).It implies that organizations will rather not disclose environmental information that will cause damage to its reputation even if it will be beneficial to the stakeholders and the larger society. **The 'socio- political economic theory'** was the framework upon which the legitimacy theory and the stakeholder theory were built. Both theories connect via the political economic theory (Hahn et al., 2015; Gray et al., 1995). In '**signaling theory',** organizations engage in environmental disclosure mainly to build a good reputation and enhance the public perception of their brand (Kalu et al., 2016). It also affirm that companies that provide adequate disclosure are offered lower cost of capital as incentives by the market (Guo et al., 2022: Healy &Pelepu, 2001)(Matisoff et al., 2013:Lyon & Kim,2011; Barber, 2007).Firms' choice of climate change disclosure is backed by legitimacy theory, signaling theory, stakeholder theory and voluntary disclosure theory. The formulation of Hypothesis is based on the findings and empirical evidence of the aforementioned studies on Institutional, Signaling, Legitimacy, Stakeholder holder and Voluntary Disclosure Theory**.**

$\boldsymbol{H_1}$ Climate change disclosure quality is associated with firm's ownership structure

3. Method

In assessing the quality of the climate change disclosures; the evaluation criterion is such that we analyze the contents of 'annual reports and sustainability reports' of selected 'companies'. We adopt the climate change disclosure index that was based on the contents of the TCFD recommendation framework. We review each disclosure item in the index using evaluation criteria based on disclosure quality levels and we apply equal weighting on each of the item according to their disclosures. The detail description of the environmental disclosure guide is presented in the appendix. We collect data manually from the content analysis of each company's environmental disclosures in the 'annual reports' that was published alongside the 'sustainability reports' by the selected firms that are listed on Nigerian Stock Exchange market.

We collect data on our sample firms to ascertain the type of corporate ownership structure each sample firm is operating from the annual reports and 'Securities and Exchange Commission (SEC)' report in Nigeria. The population of this study comprises of 'non- financial sector' multinational companies (large corporations), and other publicly owned indigenous businesses listed on the Nigeria Stock Exchange (NSE) as at December 2023. The sample size was made up of 50 firms that are publicly listed on the Nigerian Stock Exchange market and have published their annual reports and sustainability reports for three years between 2020-2022.The selected firms consist of 32 multinational companies, and 18 publicly owned indigenous

businesses that span across 6 sectors of the economy namely the Agriculture, Mining & Quarrying, Manufacturing, Electricity, Gas Supply, Construction and Transportation.

The independent variable is the **business ownership structure** which consist of the institutionally owned firms (PINST), managerial owned companies (MOWN), state owned business structure (STATE), family owned(FAM); foreign owned businesses(FOR) including firms with percentage of shares held by shareholders is 5% or more in total number of shares(BLOCK). From the analysis of the sample firms' ,34% of the sample consist of shareholders with percentage number of shares held is 5% or more in total number of shares, family controlled businesses consist of 8% of the total sample,28% are foreign owned businesses ,24% are institutionally owned businesses and 6% of the total sample firms are owned by government. We control for **size** (firm's total asset), **profitability** (annual net income**),** and **liability.** The companies selected experienced both losses and profits; 24% of the selected companies made losses and 76% of the companies made profits 'at the end of the year' 2022. The 'variables' alongside its definitions and measurements is shown in the appendix.

The dependent variable is categorical because it presents three categories of disclosure quality with non-disclosures (ND) denoted as 0, Low quality climate disclosures (LQCD) denoted as 1 and high quality climate disclosures (HQCD) denoted as 2.These variables are based on numeric scores we assigned to each sample firms' climate disclosure quality. We adopt the logistic regression model and the logistic function is of the form

$Y = = e^{\wedge} (\beta_0 + \beta_1 X) / (1 + e^{\wedge} (\beta_0 + \beta_1 X)$ (1)

Where X is a vector of independent variable, Y is the choice of climate change disclosure CCCD.

β_0 = intercept term, β_1 = the coefficient for the single input value (x). Re-writing the equation; we have;

$\text{In} \left(\frac{Y}{1-Y}\right) = (\beta_0 + \beta_1 X)$ and substituting for X and Y;

$\text{In} \left(\frac{CCCD}{1-CCCD}\right) = (\beta_0 + \beta_i X_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \beta_n X_n)$ (2)

Choice of climate change disclosure CCCD could either be high quality climate disclosure HQCD or low quality climate disclosure LQCD .ND denotes no disclosure .Therefore;

$\text{In} \left(\frac{Pr(LQCD)=1}{Pr(ND)=0}\right) = \beta_{01} + \beta_1 (SZ) + \beta_2(\text{PR}) + \beta_3(\text{LB}) + \beta_4(\text{PINST}) + \beta_5(\text{MOWN}) + \beta_6(\text{FAM}) + + \beta_7(\text{BLOCK}) + \beta_8(\text{FOR}) + \beta_9 (\text{STATE})$ (3)

$\text{In} \left(\frac{Pr(HQCD)=2}{Pr(ND)=0}\right) = \beta_{02} + \beta_{10}(SZ) + \beta_{11}(\text{PR}) + \beta_{12}(\text{LB}) + \beta_{13}(\text{PINST}) + \beta_{14}(\text{MOWN}) + \beta_{15}(\text{FAM}) + \beta_{16}(\text{BLOCK}) + \beta_{17}(\text{FOR}) + \beta_{18}(\text{STATE})$ (4)

4. Empirical Results

We adopt the logistic regression analyses and paired-sample t-tests on the variables in this study. The logistic regression analyses were used to determine the 'association' of corporate 'ownership structure' on the economic drivers of firms' choice of climate change disclosures (CCCD) quality with a focus on family-owned businesses (FAM) and foreign-owned companies (FOR) that are listed on Nigeria stock exchange market. The firm's ownership structure is proxied by FAM, FOR, PINST, MOWN, BLOCK and STATE. Other economic determinants of CCCD such as SZ, PR, and LB are also included as variables in the logistic regression model. However, the paired-sample t-tests were used to test the mean difference between, LQ and HQ, LQ and HQ vs. LQ, and HQ and HQ vs. LQ.

Table 4.1: *Category of Choice of Climate Change Disclosure (CCCD)*

CCCD	Freq	Percent	Cum
Non-Disclosure	20	40	40
LQCD	13	26	66
HQCD	17	34	100

Table 4.1 report the results of the category of the Choice of Climate Change Disclosure (CCCD) in terms of frequency, percentage, and cumulative frequency respectively. Based on these results, it is found that Non-Disclosure (ND), Low-Quality Climate Disclosure (LQCD), and High-Quality Climate Disclosure (HQCD) constitute 40%, 26%, and 17% respectively. In other words, of all the sampled firms, 40% did not disclose their climate change information, 13% disclosed very little information about their climate change activities and 17% disclosed full information in their climate reports.

Table 4.2: *Descriptive Statistics of Variables*

Variable	Obs	Mean	Std.Dev	Min	Max
CCCD	50	0.94	0.8668498	0	2
SZ	50	44793.2	117915.1	0.083	465769.5
PR	50	422490.4	2956803	-12326.99	2.09E+07
LB	50	14.63232	334.5964	-2123.529	413.272
PINST	50	39.875	24.92051	2.89	85
MOWN	50	9.282367	8.471688	0.00389	41.6
FAM	50	75.3192	7.127589	56.4	85.5
BLOCK	50	53.8066	28.84853	5	98.2
FOR	50	67.2068	23.03798	0.12	94
STATE	50	28.2008	29.89174	0.06	93

FAM=Family owned business, BLOCK=Shares of 5% and above held by individuals, FOR=Foreign owned businesses, STATE= Business ownership by government, PINST=Institutional owned business, MOWN=Businesses owned by members of the board. SZ=Size, PR=Profitability, LB=Liability, CCCD=Choice of climate change disclosure

The summary of descriptive statistics in Table 4.2 show the statistical properties or behaviors of the dependent and independent variables used in the study. According to these statistics, the average or mean values of CCCD, SZ, PR, LB, PINST, MOWN, FAM, BLOCK, FOR, and

STATE are 0.94, 44793.2, 422490.4, 14.63232, 39.875, 9.282367, 75.3192, 53.8066, 67.2068 and 28.2008 respectively. Furthermore, CCCD, FAM, and MOWN revealed fewer dispersions (0.94, 7.127589, and 8.471688) from their respective means or averages. Besides, FOR, PINST, BLOCK, STATE, LB, SZ, and PR revealed wider variations which means that these variables are quite dispersed from their respective means.

Figure 4.1: *Correlation matrix for the variables*

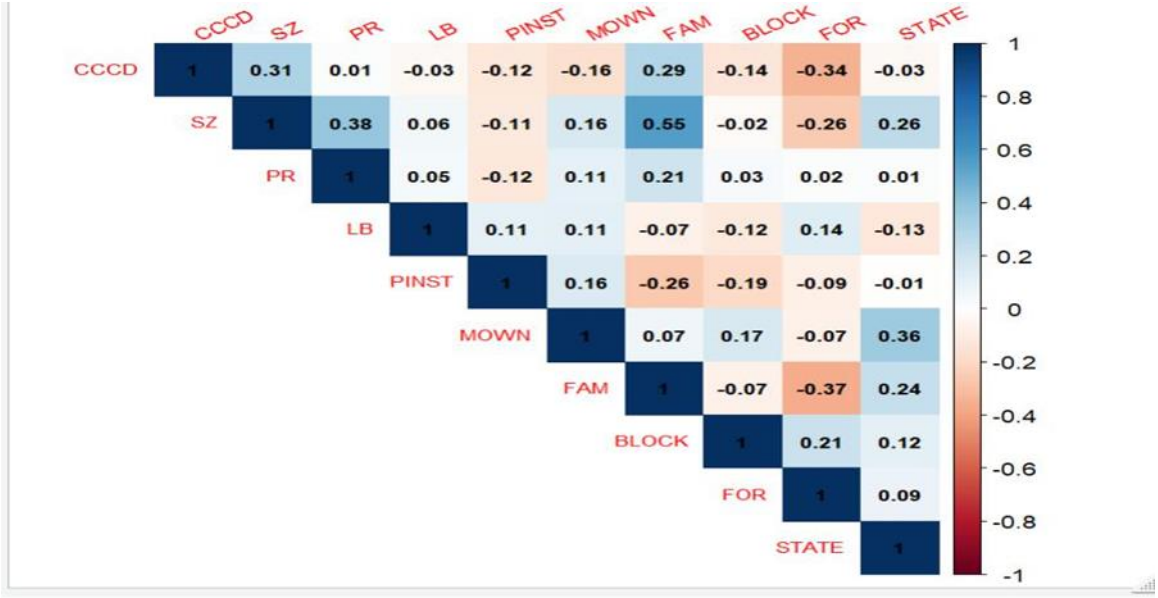


Table 4.3: *Estimates of the correlation matrix for the variables*

Note: the bold values represent the relevant pair-wise correlations in the study. FAM=Family owned business, BLOCK= Shares of 5% and above held by individuals, FOR=Foreign owned businesses, STATE= Business ownership by government, PINST=Institutional owned business, MOWN=Businesses owned by members of the board. SZ=Size, PR=Profitability, LB=Liability, CCCD=Choice of climate change disclosure

	CCCD	SZ	PR	LB	PINST	MOWN	FAM	BLOCK	FOR	STATE
CCCD	1									
SZ	0.3093	1								
PR	0.0119	**0.3839**	1							
LB	-0.0338	0.0557	0.0486	1						
PINST	**-0.1233**	-0.1136	**-0.1239**	**0.1051**	1					
MOWN	**-0.1635**	**0.1625**	**0.1093**	**0.1143**	**0.1567**	1				
FAM	**0.2933**	**0.5519**	**0.2085**	-0.0736	**-0.2644**	0.067	1			
BLOCK	**-0.1384**	-0.0203	0.031	**-0.1187**	**-0.195**	**0.1671**	-0.0749	1		
FOR	**-0.3429**	**-0.2557**	0.0155	**0.1396**	-0.0878	-0.0701	**-0.3659**	**0.2145**	1	
STATE	-0.0345	**0.2559**	0.0104	**-0.1252**	-0.0067	**0.3584**	**0.2368**	**0.1188**	0.0851	1

The correlation matrix in Figure 4.1 and estimates of correlation analysis presented in Table 4.3 was used to analyze the pairwise correlation or 'relationship between' each 'independent variable' concerning the 'dependent variable' CCCD only. There exists a moderately low correlation of 0.31 between CCCD and SZ ($r_{CCCD.SZ} = 0.31$) while there exists a very little or zero positive correlation between CCCD and PR ($r_{CCCD.PR} = 0.01$).

More so, there exists a minute negative correlation of -0.03 between CCCD and LB ($r_{CCCD.LB} = - 0.03$). Of all the six ownership structure variables used in this study, four (i.e. PINST, MOWN, BLOCK, and FOR) of them exhibit very low negative pairwise correlations between

them and CCD ($r_{CCCD.PINST}$ = -0.12, $r_{CCCD.MOWN}$ = -0.16, $r_{CCCD.BLOCK}$ = -0.14), FAM exhibits a small positive pairwise correlation of 0.29 with CCCD ($r_{CCCD.FAM}$ = 0.29) and STATE exhibit very little or negligible negative pairwise correlation of -0.03 between itself and CCCD ($r_{CCCD.STATE}$ = -0.03). Consequently, this suggests that the firm's ownership structure is linked to the purpose-driven choice of climate change disclosure quality which is proxied as CCCD. Hypothetically, a firm's ownership structure is linked to the purpose-driven choice of climate change disclosure quality.

Table 4.4: *Estimates and Standard Errors of Choice of Climate Change Disclosure (CCCD)*

Residual Deviance: 69.43327 AIC: 109.4333, FAM=Family-owned business, BLOCK= Shares of 5% and above held by individuals, FOR=Foreign owned businesses, STATE= Business ownership by government, PINST=Institutional owned business, MOWN=Businesses owned by members of the board. SZ=Size, PR=Profitability, LB=Liability, CCCD=Choice of climate change disclosure

Table 4.4 presents the estimates and standard errors of the estimated logistic regression model. It will be difficult to determine the impacts of the ownership structure variables and other included variables on the categorical dependent variable CCCD since the p-values of the respective estimated regression coefficients are excluded from the same Table 4.3.

	Coefficients:					
Category	(Intercept)	SZ	PR	LB	PINST	MOWN
1	5.408462	0.006489291	-9.39E-05	0.01077281	-0.047521	-0.077543
2	4.580979	0.006494796	-9.43E-05	0.00377269	-0.019579	-0.082816
Category	FAM	BLOCK	FOR	STATE		
1	-0.04444431	-0.00208076	-0.0250391	0.01625195		
2	-0.02324326	-0.00357492	-0.0333455	0.00459574		
	Std. Errors:					
Category	(Intercept)	SZ	PR	LB	PINST	MOWN
1	3.47E-05	0.00294968	0.00026243	0.00260363	0.0010701	0.0003172
2	3.06E-05	0.002949767	0.00026243	0.00284434	0.0014027	0.0002404
Category	FAM	BLOCK	FOR	STATE		
1	0.002563104	0.002268694	0.00246319	0.00181057		
2	0.002252342	0.001842639	0.00202319	0.00088741		

From Table 4.3, the estimated multinomial logistic regression equations for the Low-Quality Climate Disclosure (LQCD) and High-Quality Climate Disclosure (HQCD) categories under CCCD are stated as equations (4.1) and (4.2)

$$\ln\left(\frac{\Pr(LQCD=1)}{\Pr(\text{No Disclusure}=0)}\right) = 5.408462 + 0.006489291(SZ) - 9.39E-05(PR) + 0.01077281(LB) - 0.047521(PINST) - 0.077543(MOWN) - 0.04444431(FAM) - 0.00208076(BLOCK) - 0.0250391(FOR) + 0.01625195(STATE) \quad (4.1)$$

$$\ln\left(\frac{\Pr(HQCD=1)}{\Pr(\text{No Disclusure}=0)}\right) = 4.580979 + 0.006494796(SZ) - 9.43E-05(PR) + 0.01077281(LB) - 0.019579(PINST) - 0.082816(MOWN) - 0.02324326(FAM) - 0.00357492(BLOCK) - 0.0333455(FOR) + 0.00459574(STATE) \quad (4.2)$$

Table 4.5: *Regression of the independent variables on CCCD*

	1	2
	(1)	(2)
SZ	0.006 (0.003)**	0.006 (0.003)**
PR	-0.0001 (0.0003)	-0.0001 (0.0003)
LB	0.011 (0.003)***	0.004 (0.003)
PINST	-0.048 (0.001)***	-0.020 (0.001)***
MOWN	-0.078 (0.0003)***	-0.083 (0.0002)***
FAM	-0.044 (0.003)***	-0.023 (0.002)***
BLOCK	-0.002 (0.002)	-0.004 (0.002)*
FOR	-0.025 (0.002)***	-0.033 (0.002)***
STATE	0.016 (0.002)***	0.005 (0.001)***
Constant	5.408 (0.00003)***	4.581 (0.00003)***
Akaike Inf. Crit.	109.433	109.433

Note: *p<0.1; **p<0.05; ***p<0.01

Table 4.5 presents the approximate estimates of the regression model and their respective p-values which will enable us to determine if the ownership structure variables and other included variables significantly impact the CCCD or not. Table 4.4 revealed that the constant terms in regression equations 4.1 and 4.2 are statistically significant (p-values < 0.05) in the model. Furthermore, results of the estimated multinomial logistic regression model presented in the same Table 4.4 established that all ownership structure variables (i.e. PINST, MOWN, FAM, FOR, and STATE positively or negatively impact the choice of climate change disclosures (CCCD) except BLOCK (p-values < 0.01) which does not have any impact on CCCD (p-values > 0.05).

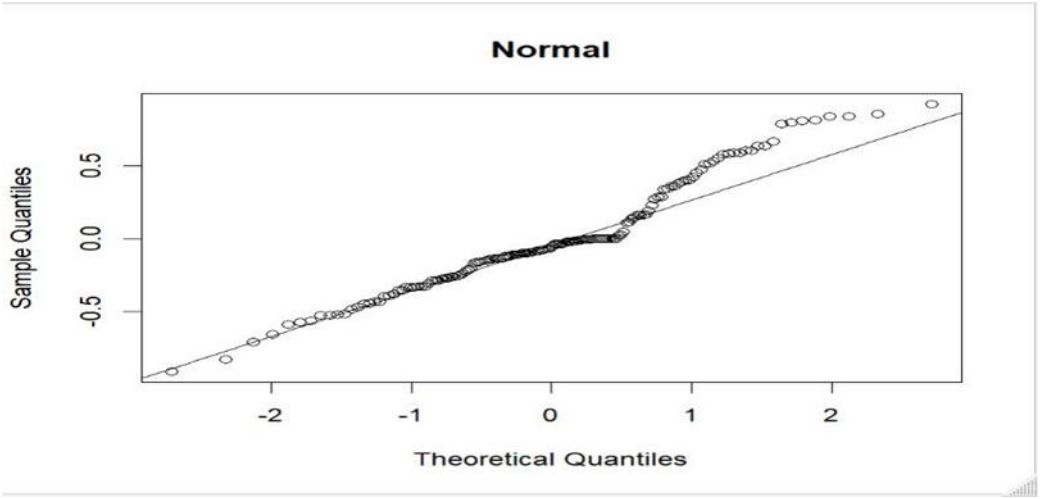
Specifically, PINST, MOWN, FAM, and FOR have negative impacts on both the low quality disclosures LQCD and high quality disclosures HQCD categories of the choice of climate change disclosures CCCD whereas STATE has positive impacts on both the LQCD and HQCD categories of the CCCD. Statistically, PINST, MOWN, FAM, and FOR are said to be negatively statistically significant at a 1% level of significance in the model. SZ, PR, and LB are other economic determinants of CCCD which are also included in the model. Of all these determinants, only PR does not have any significant impact on CCCD (p-value > 0.05) while SZ has positive impacts on the LQCD and HQCD categories of the CCCD.

Lastly, LB only has positive impacts on LQCD category of the CCCD while it does not have any significant impact on the HQCD category of the CCCD. In view of these, it can be said that

the choice of climate change disclosure is linked to firm's ownership structure which supports our hypothesis.

The normal Q-Q plot in Figure 4.2 suggests that the residuals obtained from the fitted logistic regression model are non-Gaussians since there is a heavy tail at the top of the slope. In other words, the residuals are not normally distributed with zero mean and constant variance (Ɛ~NIID $(0, \sigma^2)$.

Figure 4.2: *Normal Q-Q plot obtained from the residuals of the fitted model*



For suitable confirmation of the normality status of the residuals, the Shapiro-Wilk normality test has been conducted to confirm what is reported by the plot.

Table 4.6: *Shapiro-wilk normality tests for the residuals of the fitted model*

Results of Shapiro-Wilk normality tests in Table 4.6 showed that the null hypothesis of

Data	U1
w=0.95949	p-value=0.0002201

normality has been rejected for the residuals since the p-value (=0.0002201) is less than 5% chosen level of significance α. Consequently, the residuals from the fitted multinomial model are not normally distributed which fulfils the assumption of non-normality of residuals logistic regression models.

5. Discussion

This research study test the association of business ownership structure on the economic drivers of climate change disclosure choices of multinational and indigenous firms that are listed on Nigeria stock exchange market. We adopt the climate disclosure index based on TCFD recommendation framework and we performed logistic regression analysis. Our result show that the choice of climate change disclosure quality is linked to corporate ownership structure. It indicate that the family controlled businesses and foreign controlled businesses has negative correlation to the choice of climate change disclosure; it implies that the ownership of a firm have the capacity to influence its management on what extent they approve the disclosure of climate information. Our findings support 'voluntary disclosure theory', 'signaling theory', 'legitimacy and stakeholder theory'. However, we did not find in our study that high quality climate change disclosures indicate full transparency in reporting by organizations.

We interpret our findings with reasons why it support 'signaling theory', 'legitimacy theory', and 'voluntary disclosure theory'; first it supports 'signaling theory' on the position that companies will likely provide high quality disclosures because of the possibility to be offered lower cost of capital as incentives by the market. This may prompt firms to withhold vital information and report what seems like a high climate disclosures because of the benefits the market offers in this regard. This further supports voluntary disclosure theory because organizations will rather not disclose information that will cause damage to their reputation even if it is of immense benefits to the stakeholders and the larger society (see Guo et al.,2022;Verrenchia,1983).Furthermore, our empirical results support legitimacy theory in the sense that companies may give the impression of not being involved in what is unacceptable to the public by appearing to be doing what is right whereas this form of appearance may not be the actual standing of the organization concerning their climate change activities (Solikhah et al., 2020) .In other words, company's climate change disclosure is usually separated from their environmental performance (see Liu et al., 2023).Corporations may publish environmental disclosures to secure their legitimacy to operate and ensure their continued existence (Lakhani &Herbert, 2022: Spence et al., 2010).This may compel corporations to publish high quality climate disclosures by all means which could imply that companies that choose to report high quality climate activities may have the tendency of withholding vital climate information which supports the 'stakeholder theory'(Lakhani &Herbert ,2022: Chen& Roberts,2010) (Dye et al., (2021).

This research work contributes to existing literature by providing important theoretical implications; apart from confirming existing theories on the impact of business ownership structure on the drivers of firms' choice of climate change disclosures. It takes on the novel perspective of the fundamental importance of transparency in the choice of climate change disclosures. It implies that transparency; the willingness to withhold information or not is an essential part of firms' decision concerning the choice of climate disclosure quality (See Akrout&BenOthman, 2016, Muslu et al., 2019). Prior studies on the factors that determines environmental disclosures; Cormier & Magnam (1999), (Amran et al., 2011) Amran et al., (2014), Kalu et.al. (2016), Baalouch et al.(2019),Caby et al.(2020), Desai(2022), Mou Ruiqin & Ma Tao(2023), Halkos&Skouloudis (2016), Vithanage &Shamil(2022), Mehedi et al.(2023) did not pay close attention to how business ownership structure influences transparency concerning the choice of climate disclosure quality. Our work is distinct from prior studies because we considered the association of various types of business ownership structure with the inclusion of **Family Controlled Businesses** and **Foreign Owned Businesses** on the choice of climate change disclosure quality in one study. Our findings which reveal the importance of transparency in climate disclosure quality will be useful to meet the current need of investors, regulators, business managers and the general public regarding climate change reporting. The socio-political theory support the technological advancement processes that will be required for the future needs of climate change disclosures. The theory affirm that the increased probe by stakeholders could result in higher cost of withholding information concerning environmental disclosures (see Mongie &Willows, 2018: Stanny&Ely, 2008).This probe by stakeholders could influence the adoption of emerging technology to mitigate the problem of greenwashing in disclosures. Our research study provides practical implication for business owners by bringing forth the awareness of the impact of transparency on choice of climate disclosures on their businesses .Our results also support the effort of stakeholders, regulators, and investors in encouraging corporations to publicly report their climate information. This will promote reliability in disclosures and this form of public disclosures can be enhanced by adopting a blockchain enabled climate disclosure framework to ensure clarity, accuracy and reliability in reporting .The adoption of IoT blockchain enabled reporting framework will improve the decision making process of investors and regulatory institutions (Drescher, 2017;

Hughes et al., 2019; Yuan&Wang, 2016; Sharif&Ghodoosi, 2022) (Quin et al., 2019; Omohundro, 2014; Dorri et al., 2016; Ferrer 2016).The theoretical and the practical implications of this study is applicable globally although the data for this analysis is derived from firms located in Sub-Saharan Africa however, most of the sample firms(64%) are

multinationals with their presence in multiple countries across the globe. This research study is expected to provide new awareness regarding environmental disclosures at global level in the aspect of advocating for IoT blockchain technology to erase the challenges of greenwashing in climate risk reporting.

Conclusion

Our research work examined the economic drivers of firms' purpose driven choice of climate change disclosures by testing the association of business ownership structure on the choice of climate disclosure quality. The contribution of our study emphasized that corporate ownership structure of Foreign Owned Business, Family Controlled Businesses, Institutional and Managerial Owned firms have negative correlation on the choice of climate change disclosure quality. This evidence is backed by 'legitimacy theory', 'voluntary disclosure theory', 'stakeholder theory' and 'signaling theory'. This study takes on the novel perspective that technological advancement will be required to achieve a transparent high quality disclosures to meet the future needs of climate change reporting. Our work supports the effort of stakeholders, regulators and investors in promoting public disclosures of climate risk reports and this can be enhanced by adopting IoT blockchain technology to ensure clarity and accuracy which is critical for decision making of business managers, regulators, policy makers and investors. Our study experienced limitations regarding the sample size which was quite small because it was focused on Nigeria although part of the sample firms are multinationals. In view of this, future research opportunities should consider cross-countries in this regard.

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Appendix

Table3.1: *Climate Change Disclosure Index based on TCFD Recommendation Framework*

TCFD Recommended Disclosure		**Low quality disclosure**	**High Quality Disclosure**	**No Disclosure**
Governance Disclose the organization's governance around climate related issues and opportunities based on the following: 1.Board level oversight on climate relate opportunities and risks 2. Detail description of management's role in evaluating and managing climate related risks and opportunities.		A mention of environmental /sustainability committee assigned by the board. A mention of management role with a sentence or some words, regarding general environmental issues.	In-depth explanations on how the committees will work regarding climate change related issues A detailed explanation of management's role and in-depth assessment of the environmental issues	No disclosure No disclosure
Strategy Present the impact of climate related risks and the opportunities for the organizations business, strategy and financial planning where such information is material	Narrate the climate related risks and opportunities the organization has identified over the short ,medium and long term	Stating general disclosures of environmental issues integrated into business strategy	Indicating specific disclosures of climate change issues (e.g. GHG emission issues)integrated into business strategy	No disclosure
.Climate related issues integrated into firm's business objectives and strategy.	1 Recount the environmental impact of climate related risks and opportunities on the firm's businesses, strategy and financial planning 2 Relate the resilience of the organization's strategy, taking into account different climate-related scenarios including a or lower scenarios.			
Risk Management Recount how your organization identify ,assess and manages climate related risks ; 1.What are the processes for identifying, evaluating, and managing risk and opportunities of climate-related issues 2.What are the inherent climate-related risks with the potential to have an impact on business disclosure 3. What are the inherent climate-related opportunities with the potential to have an impact on the business?	"§ Narrate the organization's procedures for identifying and evaluating climate related risks - depth account of the organization's strategy for managing climate related risks organization's processes for identifying, assessing climate related risks that are integrated into the organization's overall risk management"	Stating general disclosures of environmental issues integrated into business strategy; 1 A mention of general environmental Risks and Opportunities. 2. A mention of the risks. 3. A mention of the opportunities.	Indicating specific disclosures of climate change issues (e.g. GHG emission issues)integrated into business strategy 1.An explanation of the procedures(methodology) 2. A detailed explanation of the risks or numeric disclosure. 3. Comprehensive explanation of the opportunities or a quantitative disclosure.	No disclosure No Disclosure No Disclosure No Disclosure

Metrics and Targets Disclose the metrics and target used to assess and manage relevant climate related risk and opportunities where such information is material "Report Scope 1, Scope 2 and if necessary Scope3 GHG emissions and the related risks. " Recount the targets set by the organizations to manage climate related risks and opportunities and performance against targets	Disclose the metrics adopted by the firm for the assessment of climate related risks and opportunities in line with its strategies and risk management processes.	Disclosure of scope 1 and scope 2 emission including scope 3 emission if necessary. Just a mention of net zero targets.	Progress against previous year for scope 1, scope 2 and if necessary scope 3 GHG emission data. Detail description of net zero emission targets and aims.	No disclosure No disclosure

Source: The Taskforce on Climate Related Financial Disclosures (TCFD) Good Practice Handbook (2021).

Figure 3.1: *Level of Climate Change Disclosures of Selected Companies*

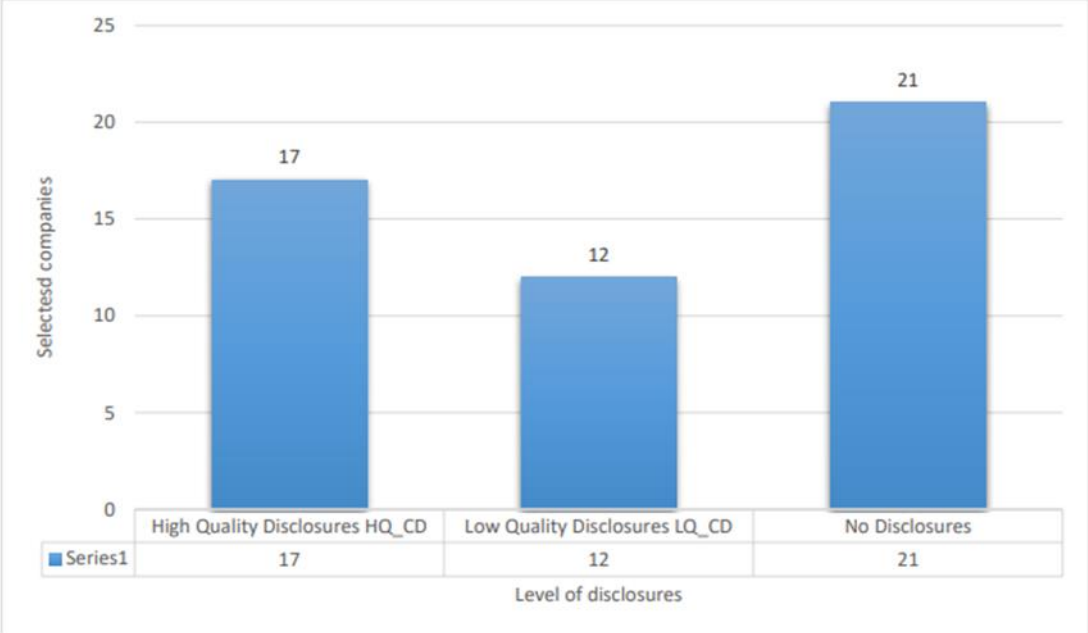

Table3.2: *Classification of Companies' Economic Activities using the ISIC Codes and their 2022 Climate Change Disclosure Quality*

Sector	Group	Class	Description	LQ_CD	HQ_CD	No Disclosure
Agriculture						
	011	0111	Growing of cereals (except rice), leguminous crops and oil seeds			✓
	012	0127	Growing of beverage crops			✓
Mining and Quarrying						
	071	0710	Mining of non-ferrous metal ores	✓		
	072	0729	Mining of other non-ferrous metal ores			✓
	089	0893	Extraction of salt		✓	
Manufacturing						
	106	1061	Manufacture of grain mill products		✓	
	107	1071	Manufacture of bakery products	✓		
		1072	Manufacture of sugar		✓	
		1073	Manufacture of cocoa, chocolate and sugar confectionery			✓
		1073	Manufacture of cocoa, chocolate and sugar confectionery			✓
		1074	Manufacture of macaroni, noodles, couscous and similar farinaceous products	✓		
	108	1080	Manufacture of prepared animal feeds			✓
	110	1101	Distilling, rectifying and blending of spirits	✓		
		1103	Manufacture of malt liquors and malt	✓		
		1103	Manufacture of malt liquors and malt	✓		
		1103	Manufacture of malt liquors and malt			✓
		1103	Manufacture of malt liquors and malt			✓
	192	1920	Manufacture of refined petroleum products			✓
	201	2013	Manufacture of plastics and synthetic rubber in primary forms			✓
	202	2022	Manufacture of paints, varnishes and similar coatings, printing ink and mastics	✓		
		2022	Manufacture of paints, varnishes and similar coatings, printing ink and mastics			✓
		2023	Manufacture of soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations.		✓	
		2023	Manufacture of soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations		✓	
		2029	Manufacture of other chemical products n.e.c		✓	

	210	2100	Manufacture of pharmaceuticals, medicinal, chemical and botanical products			✓
	210	2100	Manufacture of pharmaceuticals, medicinal chemical and botanical products			✓
	231	2310	Manufacture of glass and glass products		✓	
	239	2393	Manufacture of other porcelain and ceramic products			✓
		2394	Manufacture of cement, lime and plaster	✓		
		2394	Manufacture of cement, lime and plaster		✓	
		2395	Manufacture of articles of concrete, cement and plaster			✓
		2395	Manufacture of articles of concrete, cement and plaster		✓	
	242	2420	Manufacture of basic precious and other non-ferrous metals			✓
	243	2431	Casting of iron and steel		✓	
	273	2732	Manufacture of other electronic and electric wires and cables	✓		
		3250	Manufacture of medical and dental instruments and supplies			✓
	329	3290	Other manufacturing n.e.c.			✓
Electricity, gas, steam, air- con supply						
	351	3510	Electric power generation, transmission and distribution			✓
		3510	Electric power generation, transmission and distribution	✓		
		3510	Electric power generation, transmission and distribution		✓	
	352	3520	Manufacture of gas; distribution of gaseous fuels through mains			✓
			Manufacture of gas; distribution of gaseous fuels through mains		✓	
			Manufacture of gas; distribution of gaseous fuels through mains		✓	
			Manufacture of gas; distribution of gaseous fuels through mains		✓	
			Manufacture of gas; distribution of gaseous fuels through mains		✓	
			Manufacture of gas; distribution of gaseous fuels through mains	✓		
			Manufacture of gas; distribution of gaseous fuels through mains		✓	
			Manufacture of gas; distribution of gaseous fuels through mains		✓	
Construction						
	421	4210	Construction of roads and railways	✓		
Transportation and storage						
	522	5223	Service activities incidental to air transportation			✓

Source: International Standard industrial classification of all Economic Activities (ISIC) Revision 4. (2008).

Table 3.3: *Variables; Definitions and Measurements*

Variables	Descriptions	References
CCCDQ	Choice of climate change disclosure quality .This includes (LQ_CD) Low quality climate change disclosure and (HQ_CD) High quality climate change disclosure.	Park et al. (2023).
PINST	Percentage of shares held by institutional investors % of shares held by long term institutional investors % of shares held by short term institutional investors	Garcia-meca& Purcheta-martinez (2018), El-Diftlar et al.(2017), Ilhan et al.(2022)
MOWN	Percentage of shares held by members of the board. Managerial Ownership	Eng&Mak(2003), Matoussi & Chakroun (2014), Sugathadas Kaushalya (2019).
FAM	Family owned businesses. % of equity owned by family.(majority of the ownership of the business is controlled by at least one family	Md Zaini et al. (2020).
BLOCK	The shareholders own a minimum of 5% total number of shares or more.	Zheng et al. (2014), Sugathadas Kaushalya (2019).
FOR	Foreign owned businesses. (S&P 500 companies).% of equity owned by foreigners;	Khanna et al.(2004)
STATE	Government owned businesses; largest % of shares is held by government	Lee et al.(2017)
SIZE	Total assets	Park et al. (2023), Borghei,2021
PRO	Total net income of sample firms	Park et al.,2023
LIAB	Firms' financial obligations including debt	