Acta Universitatis Danubius
ŒCONOMICA

Climate Accounting and Corporate Contributions to Fiscal Sustainability in Emerging Economies

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Abstract: Objectives: This study sought to provide empirical evidence of effect of environmental performance on the contribution of manufacturing firms to fiscal sustainability in South Africa and Nigeria and why it is significant to comprehend this relationship in developing economies that want to not only have accountable environmental activities, but also have predictable levels of revenue to the government. **Prior Work**: Prior studies have mostly investigated the terms environmental disclosure, environmental performance or sustainability reporting and their relationship with the value of firms or governance performance. But little has been done on the impacts of corporate practices related to climate on the real fiscal contributions in terms of taxes on a firm level. **Approach**: The analysis applies quantitative econometric methods such as descriptive statistics, regression modelling and robustness estimation. **Results**: The results indicate that climate accounting indicators have an adverse effect on corporate tax contributions while firm size and economic growth have positive influence. **Implications:** The findings indicate the significance of considering the environmental accountability alongside fiscal policy to policymakers, regulators and company managers. **Value**: The article offers new firm-level data of the connection between climate accounting practices and financial sustainability in the form of corporate tax payments.

Keywords: Emission; Energy; Taxation; Sustainability

JEL Classification: M40, M41, M42

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1. Introduction

The manufacturing companies play an important role in the development of the country. They create employment, manufacture products and provide high corporate tax funds. In several economies, corporate taxes finance the system of social welfare, infrastructure and even the public goods, therefore they are a major factor to fiscal sustainability. However, these companies also have a negative impact on the environment due to excessive energy consumption and greenhouse gas emissions, which puts the development of growth and sustainability at a cross (Schaltegger & Csutora, 2016). Climate accounting is now a necessary managerial instrument of the firms that desire to quantify, control, as well as report their environmental effects. It introduces environmental information, including emissions and energy consumption, into accounting, extending the conventional financial reporting to include environmental performance (Gulluscio et al., 2020; Agustini & Arifa, 2024).

The climate accounting assists companies in aligning the strategy and sustainability objectives. It has been found that placing emphasis on climate issues enhances environmental performance and wider ESG performance, such as resource efficiency and environmental investment (He et al., 2025). The majority of studies that have been conducted associating environmental or sustainability practices with corporate behaviour had been on the subjects of tax avoidance or aggressiveness, and not on tax contribution. Indicatively, corporate sustainability disclosures and ESG performance have been found to affect tax behaviour in Malaysia, China and other nations (Zhang et al., 2025; Feng et al., 2024; Sian et al., 2024). Socially responsible companies are known to pay higher tax rates, whereas some other companies tend to vary avoidance practices depending on exposure to climate risks (Zhang et al., 2025). In other studies, environmental regulation is linked to tax avoidance in industrial companies by environmental regulation instruments such as emissions trading systems or carbon risk. The evidence of Chinese carbon-trading shows that environmental policy has an impact on the outcome of taxation. Nevertheless, these researches fail to consider whether the accounting practices of the internal climate have any impact on the level of corporate tax payable which is a key aspect of public finance.

Even though it has been shown that there has been progress in the context of learning about corporate environmental behaviour and firm outcomes, there is a lack of empirical data that connects climate accounting practices to the actual fiscal contribution in terms of tax income paid (Hahn et al., 2015; Gu & Wang, 2023).

Majority of the research on climate accounting has concentrated on disclosure quality or environmental performance and have given less consideration to the fiscal impact of environmental management decisions (Schaltegger & Burritt, 2018; Li et al., 2022). The literature on fiscal sustainability puts more emphasis on macroeconomic variables like government debt and revenue-to-GDP ratios but does not focus on firm-level determinants of tax revenue (Brautigam et al., 2008; Fjeldstad & Heggstad, 2009). This is of particular concern in developing economies, where the manufacturing companies are a significant source of national income and are under increasing pressure to enhance their environmental response (Feng et al., 2024, Gu & Wang et al., 2023). Therefore, this paper will analyze the correlation between climate accounting practices and corporate payments to fiscal sustainability as indicated by the tax payments made of manufacturing firms in Nigeria and South Africa.

Other literature puts focus on the environmental aspect of firm behavior. They demonstrate that ESG performance increases when managers concentrate on climate (He et al., 2025). Environment taxes are also determinants of firm innovation and performance, particularly in manufacturing environment like China (Zhao et al., 2025). Nevertheless, the literature remains focused on firm performance or disclosure practices or outcomes of environmental investment. It does not delve much on the wider public-finance ramification of such practices. The absence of empirical research that examines whether or not climate accounting, as reflected by operational indicators such as energy consumption and Scope1 emissions, has any effect on the actual payments of corporate tax in the form of income is pronounced.

Corporate tax is considered an important part of the national revenue; however, the connection with the measurement of the environment has been overlooked. Although there are indicative records to show that the environmental and ESG performance impact the tax behavior in the general, no research has explored the relationship between the climate accounting practices and the amount of corporate tax income paid directly. This paper fills this gap by investigating the relationship between climate accounting by manufacturing firms and tax payments and provides new, micro-level findings regarding the role of corporate environmental action in the context of the public-finance.

2. Literature Review

2.1. Theoretical Framework

This paper is based on the Stakeholder Theory, Legitimacy Theory, and Fiscal Sociology Theory to describe the relationship between climate accounting and corporate tax income as a fiscal sustainability mechanism. According to Stakeholder Theory (Freeman, 1984; Clarkson, 1995), companies have their obligations to various stakeholders, including shareholders, employees, regulators and the whole society. The interests of these people should be taken into account in their decisions. In this regard, the climate accounting by manufacturing firms, including emission of Scope 1 and energy use will respond to the concerns of environmental stakeholders. High efficiency and profitability can be enhanced by improving the performance of the firm in terms of environmental performance, hence, the ability of the firm to add to the national tax collection and fiscal sustainability. Another perspective to this is Legitimacy Theory (Suchman, 1995; Deegan, 2002), which states that firms accept socially and environmentally responsible actions to make them in line with social norms and expectations. This will ensure legitimacy and social acceptance, less regulatory scrutiny and make operations easier. It is this legitimacy that reinforces the corporate image and helps to maintain more stable and predictable tax payments, a direct relationship between environmental management with fiscal performance. Lastly, Fiscal Sociology Theory (Brautigam et al., 2008; Fjeldstad & Heggstad, 2009) highlights the interplay between the society and business and how they raise income. It assumes that donation to governmental income relies on financial ability as well as institutional adherence. Best climate accounting increases the efficiency of financial activities and management of risks, whereby the firms can settle their taxes in a reliable and stable manner. As a result, corporate fiscal responsibility and national revenue sustainability incorporate environmental practices in them.

Combining all three theoretical lenses, the work introduces a comprehensive framework of how climate accounting indicators, namely Scope 1 emissions, energy usage, and operational traits influence corporate tax payments. The discussion shows that the dual role of environmental management in enhancing sustainability and enhancing fiscal capacity of nations is taken.

2.2. Conceptual Review and Hypothesis Development

2.2.1. Climate Accounting

Climate accounting is the measurement, management and reporting of the environmental impact of a firm. It includes Scope 1 emissions, energy use, and other activities on the environmental side of operations (Schaltegger & Burritt, 2018; Hahn et al., 2015). In this way, a firm will indicate its sustainability and communicate the risks management and performance to the stakeholders. There is empirical evidence of how efficient operational practices, less environmental risk, and reputation can be improved through climate accounting (Feng et al., 2024; Li et al., 2022). These practices give a concrete index of environmental responsibility to manufacturing where the amount of energy consumed and direct emissions are considerable.

2.2.2. Corporate Contributions

Corporate contributions to fiscal sustainability mean that firms contribute to the national revenue by paying their taxes to support the public services and development projects (Brautigam et al., 2008). The amount of paid tax income indicates the adherence to regulations and the economic ability of the company to give. In earlier studies, the characteristics of firms such as size, capital intensity, profits are associated with the contribution to corporate taxes to suggest that there is an interaction between operational and financial factors and fiscal outcomes (Lanis & Richardson, 2012; Hanlon & Heitzman, 2010). Climate accounting and fiscal contributions are rooted in the concept that more efficient and profitable practices of firms are based on robust environmental practices, which contribute to the ability to pay less in taxation (Wang et al., 2023; Feng et al., 2024). On the other hand, an ineffective environmental management may increase the cost of operation or cause regulatory fines, decrease of taxable income. Fiscal contributions are also determined by additional firm-level factors that include the size of a firm, general firm size, macroeconomic conditions like GDP.

2.2.3. Hypothesis Development

The theoretical framework of the research is that accounting practices of corporate climate can affect the fiscal sustainability through corporate tax payments. The Stakeholder Theory postulates that environmental responsibility of a firm fosters the trust and operational legitimacy of the stakeholders. According to the legitimacy Theory, the socially and environmentally responsible activities maintain the social approval and reduce the regulatory scrutiny of society. Fiscal Sociology Theory

accentuates that the contribution to government revenue is depending on the economic performance and the capacity of the firm to contribute to the government. When combining these views, we assume that companies that perform well in climate accounting, such as those that control Scope 1 emissions and energy consumption will record increased operational efficiency and enhanced profitability as well as enhanced regulatory compliance. The results must be in terms of increased tax revenue paid, one of the major fiscal sustainability measures (Ogunyemi, 2023). However, the null hypothesis is tested formally in order to provide the empirical evidence in the study:

H_0: There is no significant relationship between climate accounting and tax income paid by manufacturing firms.

2.2.4. Empirical Review

Okuyama et al. (2025) explored the tax-payment incentives of firms with ESG in mind, and sampled firms with high, low, or no reputation risk on ESG. Their results indicate that high ESG risk in firms results in increased tax payment, and low ESG risk in firms does not lead to a change in payment depending on the ESG risk. Companies with no ESG risk would contribute more taxes as their ESG score goes up. Feng et al. (2024) applied the data on carbon-emission in 28 countries and discovered that companies that have started carbon-reduction procedures pay lower taxes. This justifies the legitimacy theory as it implies that firms will be more credible in the eyes of tax authorities by implementing such strategies. The researchers further found that there is a positive relationship between reduced tax payments and increased Return on Assets (ROA) particularly in firms that have poor operating performance.

Sastrocedjo et al. (2024) investigated the relationship between the A-share-listed firms in China and found that improved environmental performance counterproductively produced increased tax avoidance. Their sample of 567 FTSE All-Share formed between 2014 and 2022 demonstrated that there was a greater propensity of tax avoidance among firms with more desirable environmental performance. Jiang et al. (2024) conducted a study on the effect of environmental, social, and governance (ESG) performance to corporate tax avoidance. They used data on A-share listed non-financial firms in China during the period 2009-2021 and concluded that high ESG performance goes a long way in lowering tax avoidance. The mechanisms that contribute to this effect are alleviation of the financial constraints, bettering the internal quality of control and the increase of the external

supervision. Gu and Wang (2023) examined how tax avoidance is affected by environmental disclosure information (EID). They established that EID lowers tax evasion by improving green innovation and capital investment, and the impacts are more in highly polluting industries, competitive sectors and in other regions in China where tax enforcement is low and government competition is high.

The aim of this study is to examine the climate accounting practices translate to tangible corporate contribution to fiscal sustainability measured by tax income paid by the manufacturing sector thereby providing firm-level contribution to national development. The study moved beyond previous studies who focused on ROA, ROE and value as a measure of firm performance to offer new evidence on environmental and fiscal sustainability nexus in emerging economies.

3. Methodology

The research relied on secondary information comprising of annual reports of listed manufacturing companies in South Africa and Nigeria. The design was ex-post facto since the information was readily available. The panel data is 60 firms between 2015 and 2024 and the companies that are listed in the Nigerian Exchange Group (NGX) and Johannesburg Stock Exchange (JSE). The purposive sampling method has been used because of the availability of data. Winsorizing of all continuous variables was done at 1% and 99% positions. Methods of analysis were panel regression and dynamic panel-data estimation using the difference generalized method of moments, and descriptive and inferential statistics. Model Specification The research initially examined regression relationships in order to determine the effect of climate accounting on corporate tax income. The model is based on the frameworks provided by Gu and Wang (2023) Feng et al. (2024 and adjusted to the current situation. The operative correlation is written as:

Tax income ratio = f (Climate Accounting, Control Variables)

$$TAX_{it} = \beta_0 + \beta_1 SCO_{it} + \beta_2 ENER_{it} + \beta_3 PLT_{it} + \beta_4 GDP_{it} + \beta_5 FS_{it} + \mu_t$$

This study uses a dynamic panel data technique by exploring difference GMM estimator developed by Arellano and Bover (1995) and Blundell and Bond (1998) in order to analyse the relationship between climate accounting and tax income. This approach is suitable for controlling potential endogeneity, unobserved firm-specific

heterogeneity, and dynamic persistence inherent in the variables. The model in equation (2) investigates whether climate accounting affects tax income.

$$Tax_{it} = \alpha Tax_{it-1} + \alpha_1 SCO_{it} + \alpha_2 ENER_{it} + \alpha_3 PLT_{it} + \alpha_4 GDP_{it} + \alpha_5 FS_{it} + \omega_i + \varepsilon_{it}$$

In this model, the lagged dependent variable (TAX_{it-1}) captures persistence in tax income ratio, fees, ω_i represents fixed effect error term while ε_{it} connotes an idiosyncratic error term.

3.1. Measurement of Variables

This study employed several variables to investigate the relationship between climate accounting and tax income among the listed manufacturing firms in Nigeria and South Africa. Tax income (TAX) is proxied as the ratio of Tax income paid to Total Assets. Scope 1 emission is a ratio of metrics tons of CO_2 to Total Assets following similar studies, such as Safiullah et al. (2021), Li et al. (2022) which have also used the same proxy. Energy consumption is the ratio of total energy to total revenue (Metcalf, 2008). The control variables employed are plant, gross domestic product and firm size. Plant is measured as ratio of PPE to total asset (Fang et al., 2025), GDP is the natural logarithm of GDP per capital while firm size is the logarithm of Total asset (Dang et al., 2018).

4. Data Analysis and Discussion of Findings

4.1. Descriptive Statistics

The descriptive statistics of corporate tax paid as a proxy of fiscal sustainability show that there are significant attributes in the contribution made by manufacturing firms. The average ratio of firms paying taxes is 1.8% of total assets (mean = 0.018), which implies that the impact on the national revenues is significant, but the rate of contribution by firms is relatively low. The standard deviation of 0.019 indicates that the values of these contributions across firms differ significantly, which is likely to be due to differences in size, profitability, or working practices.

The distribution is skewed to the right (skew = 1.860) which means that most firms pay below-average tax, yet there are some firms that pay above-average taxes, and they form a long right tail. Also, the value of kurtosis is high (7.771) and shows that

the distribution is leptokurtic with very thick tails, which proves that the contribution of some firms to the total distribution has a significant effect. The descriptive statistics of Scope 1 emissions (mean = 0.01, SD = 0.05, skewness = 4.319, kurtosis = 22.920) and energy consumption (mean = 0.011, SD = 0.071, skewness = 10.021, kurtosis = 10.960) show that there is a significant heterogeneity in the climate accounting performance of firms.

The average direct emissions and energy consumption are relatively low, although both variables are highly variable and of skewness type positivity, which takes into consideration the fact that several firms have a disproportionately high level of emissions and energy consumption. The extreme outliers are also verified by the heavy-tailed distributions (high kurtosis). The descriptive statistics of the control variables show that there is a significant variation in terms of firm and macroeconomic variables. The skewness of plant size (mean=0.152) is positive and kurtosis is greater than 3 indicating that most firms have small operations but a few have plant sizes that are exceptionally large. The size of the firm (mean of 10.033) is positively skewed with a kurtosis that is below 3 giving the impression that most firms are compact, and there are fewer drastic outliers. GDP (mean = 3.572) assumes a negative skewness, and the value of the kurtosis takes a value that is less than 3, which means that the economic activity is not uniform with a flatter distribution with fewer high ends.

Table 1. Descriptive Statistics

	TAX	SCO	ENER	PLT	LGDP	FS
Mean	0.018	0.001	0.011	0.152	3.572	10.033
Median	0.012	0.000	0.000	0.126	3.579	10.000
Maximum	0.145	0.041	0.909	0.661	3.787	18.000
Minimum	0.000	0.000	0.000	0.000	3.344	4.000
Std. Dev.	0.019	0.005	0.071	0.135	0.200	3.269
Skewness	1.860	4.319	10.021	1.050	-0.010	0.490
Kurtosis	7.771	22.920	10.960	3.855	1.034	2.467
J. Bera	914.9	117.4	2941.4	128.450	96.658	31.087
Obs.	600	600	600	600	600	600

Source: Author's Computation

4.2. Correlation Analysis and Variance Inflation Factor

We also carried out a correlation test to establish the strength with which the variables are correlated. The Pearson product-moment correlation or correlation coefficient is a faster method that gives a brief overview of the strength and the direction of the linear relationship between the two variables. Table 2 contains the correlation coefficients of the pairs of all the variables in a 10-year duration. All the coefficients are less than 0.80 as mentioned by Bryman and Cramer (2004). Table 3 gives the variance-inflation factors (VIFs). The VIF of 1.413 is the largest and all VIFs are significantly lower than the usual cut-off of 10 which reflects that multicollinearity is not a major issue in this model. Neter et al. (1983) indicate that a VIF below 10 indicates that the regression results are reliable and low average VIF ensures that there is no multicollinearity.

Table 2. Correlation Analysis

	TAX	SCO	ENER	PLT	LGDP	FS
TAX	1					
SCO	0.061	1				
ENER	-0.024	0.073	1			
PLT	-0.083	0.119	0.283	1.000		
LGDP	0.121	0.254	0.152	0.037	1.000	
FS	0.017	0.215	0.067	0.479	0.028	1.000

Source: Author's Computation

Table 3. Variance Inflation Factors

Variable	Coeff. Variance	Uncentered VIF	Centered VIF
SCO	0.028912	1.206579	1.121793
ENER	0.000139	1.148681	1.119717
PLT	4.840005	3.221296	1.413433
LGDP	1.700005	350.8345	1.091820
FS	7.86E-08	14.11823	1.352886

Source: Author's Computation

4.3. Regression Analysis

The outcomes of the panel regression in accordance with the random effects model as it is suggested by Breusch Pagan and Hausman tests point to a number of

important conclusions about the correlation between climate accounting and corporate contributions to fiscal sustainability. The model accounts approximately 18 percent of the variation in paid tax income ($R^2 = 0.18$) and F-statistic (3.239, $p = 0.006$) indicates that the model is statistically significant and fits the data. Nevertheless, the Durbin Watson of 1.474 indicates that there is a positive autocorrelation; that is, a sequence of data is not completely independent and this may render the coefficient estimates less precise. One of the climate-accounting indicators, Scope 1 emissions, significantly relates negatively but is statistically significant with tax income paid ($t = -2.371$, $p< 0.05$).

Companies that have a greater direct emission amount pay less taxes in total as compared to their total assets, which demonstrates a negative correlation between the environmental contribution and tax contribution. Feng et al. (2024) found that companies engaging in carbon-reduction activities in 28 countries paid less tax, which supported the association between environmental performance and tax results. Plant size, similarly, is negatively associated with paid tax income, which supports the idea that larger operational facilities do not necessarily mean increased fiscal contributions- maybe due to increased expenditure or capital intensity as a result of which taxable income is lower. Conversely, firm size is positively and significantly related to paid pay taxes and this could mean that firms with high total assets pay higher taxes to the government and that is why it is expected that the size of firms has a positive and significant correlation to their fiscal capacity. All these findings imply that improved environmental performance, reduced Scope 1 emissions, and operational values, such as the plant and firm size, are significant predictors of corporate fiscal contributions. Regarding climate accounting, the results show that companies that have an emissions level below average correspond more to financial sustainability goals, which provides empirical evidence of the need to incorporate environmental management into corporate financial strategy.

Table 4. Regression Analysis

Variable	Pooled Effect		Fixed Effect		Random Effect	
	Coeff	T-Stat	Coeff	T-Stat	Coeff	T-Stat
C	-0.024	-1.635	0.007	-0.063	-0.035	-1.119
SCO	0.129	0.760	-0.511	-2.943**	-0.392	-2.371**
ENER	-0.004	-0.370	0.002	0.160	0.007	0.068
PLT	-0.016	-2.438**	-0.025	-2.329**	-0.023	-2.743**
GDP	0.011	2.778**	0.005	0.172	0.013	1.567
FS	0.003	1.367	0.009	2.148**	0.007	2.215**
Adjusted R^2	0.12		0.46		0.18	

F-Statistic	3.347	(0.005)	9.114	(0.000)	3.239	(0.006)
Durbin Watson	0.800		1.650		1.474	
Breusch Pagan Test					9.367	(0.000)
Hausman Test					5.689	(0.337)

Source: Author's Computation

4.4. Difference Generalized Methods of Moments

In order to control the problem of autocorrelation that was detected in the random effects model (DurbinWatson= 1.474), we used a Difference Generalized Method of Moments (GMM) estimator. The methodology addresses the possible endogeneity, omitted-variable bias, and serial correlation, which results in more trustworthy estimates of the coefficients of dynamic panel data. Table 5 presents Wald Chi^2 (122.42) = -0.01, which demonstrates that the model is statistically significant as a whole. A lagged dependent variable of tax(-1) used supports the specification of the dynamic as tax income paid is continuing with time. The AR (2) test (p= 0.6041) does not indicate any second-order autocorrelation, and the J-statistic (p= 0.296) indicates the validity of the instruments.

The findings are evidence that the dynamic panel model is appropriately specified and GMM is the right approach to the analysis. The lagged dependent variable ensures that the variables under consideration are dynamic and should be estimated using the GMM estimator. The statistical significance of the lagged term shows persistence in the payment of tax income, whereas Scope 1 emissions and plant size are also of importance indicating that climate-accounting variables can explain the changes in tax income beyond the historical fiscal behaviour. The outcome of GMM indicates that Scope1 emissions, the size of the plant, and the GDP have significant impacts on the amount of tax paid. Both the Scope1 emissions and the size of the plant have negative effects on the tax earnings, meaning that the companies with high direct emissions or large plants facilities contribute a smaller contribution to the fiscal sustainability, probably because of their operational costs or inefficiencies. However, the opposite is true with GDP, which is positively related, and indicates that better macroeconomic conditions correlate with an increase in corporate tax payments, since companies will work in a more promising, economically favorable environment. The results obtained shed more light on the previous random-effect findings and adjust for possible endogeneity and autocorrelation biasness. Notably, the negative correlation between Scope 1 emissions and paid tax income points to

the fact that companies that have a lesser environmental footprint are more productive in terms of their fiscal sustainability, which is the empirical evidence of combining climate-accounting exactness with corporate fiscal duties.

Table 5. Difference Generalized Methods of Moment

Variables	Coefficient	Std. Error	T-Stat	Prob.
TAX(-1)	0.0926	0.0115	8.0526	0.000
SCO	-0.2101	0.0674	-3.1137	0.002
ENER	0.0026	0.0033	0.7868	0.431
PLT	-0.0273	0.0038	-7.1799	0.000
LGDP	0.0740	0.0107	6.8833	0.000
FS	-0.0002	0.0002	-1.4381	0.151
AR(2) p-value	0.6041			
J-Statistic	38.95	(0.296)		
Wald Chi^2	122.42	(0.000)		

Source: Authors' Computation

4.5. Discussion of Regression and GMM Results

This paper has discussed the links between climate accounting indicators and corporate investments towards fiscal sustainability. It gauged the tax revenue to be paid by the manufacturing industries in Nigeria and South Africa. Through random effects and Difference GMM estimators, the study also gives solid evidence of the effects of firm-level environment and structural attributes in the fiscal outcomes. The outcomes of the discovery that Scope 1-emissions have a statistically significant and negative impact on tax income paid indicate that those firms that have larger direct greenhouse gas emissions have lower contributions to fiscal sustainability compared to the asset base. This finding is in accordance with current empirical studies that have associated environmental performance and corporate tax behaviour. As an illustration, Feng et al. (2024) demonstrate international data indicating that carbon-intensive firms do not have equal tax results Gu and Wang (2023) reveal that more environmentally risky firms is more aggressive in their tax planning while Jiang et al. (2024) also affirmed that environmentally responsible firm are less likely to engage in aggressive tax behaviour. Even though these works concentrate more on tax avoidance, the general conclusion of these works is backed by the fact that environmental inefficiency and poor management of climate have the potential to reduce taxable income, thus lowering the contribution of firms to the fiscal system.

The research is a continuation of the earlier study in that it shows that environmental impact is not a sustainability consideration alone, but also a fiscal consideration particularly in developing economies. The adverse impact of plant size on paid tax estimates, as seen under both the random effects and GMM estimations is similar to previous studies on capital intensity and corporate taxes. Research has demonstrated that companies that have large and capital-intensive businesses tend to have reduced taxable income due to increased depreciation allowances, operations expenses, and investment-related deductions (Lanis & Richardson, 2012; Li & Zhang, 2022). When applied to manufacturing companies, the large plants have the capacity of increasing output volume, but also increasing the operations and compliance expenses, which may help to smother down the taxation earnings. This observation reveals that the magnitude of physical activities does not directly correlate with the robustness of fiscal contributions, which explains the importance of managing the operational attributes when breaking down the tax manifestations.

In line with other available literature on tax, firm size positively influences and significantly impacts tax revenues paid. This finding confirms classical and new evidence that larger companies are more likely to pay higher amounts of the corporate tax because they have more activity in the economy and the strength to generate more profit (Zimmerman, 1983; Hanlon & Heitzman, 2010). In contrast to plant size, firm size, which is an indicator of the total assets, reflects the overall economic scale and not the capital intensity as it is, hence its positive correlation with tax payments. This difference explains why both variables should be incorporated to decouple structural and operational impacts on fiscal sustainability. The macroeconomic level displays the favourable and significant impact that GDP has on the GMM estimation that good economic times improve the corporate tax payment. This finding is consistent with the works of Keen and Lockwood (2010) and Kubatova and Rihova (2009) that show that economic growth increases the corporate tax base and fiscal capacity.

The study demonstrates both the firm-level climate practices and macroeconomic conditions influence corporate fiscal sustainability by adding the GDP as a control variable. In general, the results are valuable to the literature because they offer firm-level data on manufacturing companies in developing economies that has not received much attention in climate accounting and fiscal sustainability studies. This study is unique in its outright connection of measured environmental impact (Scope 1 emissions and energy-related operations) with actual tax contributions, as opposed to the previous studies that emphasize tax avoidance or environmental reporting,

providing an alternative view on the relationship between climate accounting and national revenue mobilisation.

5. Conclusions

This paper explored the connection between the accounting of climate and corporate contributions to fiscal sustainability, based on tax revenue supplied by manufacturing businesses in South Africa and Nigeria. Using a dynamic panel framework and Difference GMM estimation the findings are solid evidence that environmental performance at the firm level and structural features have a strong impact on corporate tax contribution. In particular, Scope 1 emissions and the size of the plant have a negative impact on the paid taxes and the size of firms and macroeconomic factors (GDP) has a positive impact on the fiscal contribution. The importance of the lagged tax income variable also shows that there is persistence in corporate tax behaviour, which confirms that the fiscal contribution varies slowly with time. Results add to the body of literature by going beyond tax avoidance and climate accounting studies which is prevalent but also showed that climate accounting indicators directly impact the fiscal situation. The study connects environmental performance with real tax payments, which demonstrates the importance of climate accounting as a sustainability reporting tool and, at the same time, as a form of tax revenues mobilisation at the national level. These findings support the ability of corporate strategy and public policy to incorporate the environmental management approach in an effort to enhance long-term fiscal sustainability, especially in developing economies.

6. Recommendations

a) To enhance performance over the long term, manufacturing companies should enhance climate accounting by minimizing Scope 1 emissions by producing cleaner and increasing their energy use efficiency.

b) The policymakers are advised to make climate goals relevant in tax systems by encouraging low-emission activities without lowering corporate taxes.

c) Since the trend in tax behaviour remains, the manufacturing firms ought to implement long-term climate-fiscal policies that would enable the gradual increase in the fiscal contribution of firms.

d) The regulators are advised to tighten their control of the large plants to make sure that operational scale does not decrease taxable income by way of inefficiency and poor observance.

e) It will make emissions and tax payments more visible to increase accountability and promote climate and fiscal policymaking that is evidence-based.

6.1. Recommendations for Future Research

Future studies would be able to generalise the present analysis to other industries, such as services, extractive industries or agriculture to investigate whether the association between climate accounting and corporate fiscal contributions vary with different industries. Further research can also include adding other indicators of climate accounting such as Scope 2 and Scope 3 emissions, carbon intensity, or environmental spending to offer an overarching measure of environmental performance of firms. To authenticate the observed impacts, researchers can examine other indicators of the fiscal sustainability, including effective tax rates or total contribution of government revenues. Additionally, the long-time horizons or firm-level qualitative studies can assist in the determination of the long-term financial effects of the climate accounting practices. Lastly, the studies might focus on comparative analyses on the moderating effect of regulatory quality or the intensity of environmental policies on the impact between climate accounting and corporate performance.

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