Banking Sector Development and Climate Change in Nigeria.

Gbadebo Abraham Oketooyin[1] and Yusuf Olatunji Oyedeko[2]
[1]Department of Banking and Finance, Osun State University, Osogbo, Osun State-Nigeria.
[2]Department of Finance, Federal University Oye-Ekiti, Ekiti State-Nigeria.
Corresponding Author: Yusuf.oyedeko@fuoye.edu.ng

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Abstract
Recent years have seen a shift in focus on C02 emission reduction in both the developed and emerging economies in order to improve environmental sustainability. Numerous policies and empirical research were compiled in an effort to suggest some viable policy options for achieving sustainable development. In light of this, the current study investigated the impact of Nigeria's banking sector development on climate change. The study used banking accessibility, depth, efficiency and stability to measure banking sector development while C02 emission was used to proxy climate change. Expo facto research design was used and the study covered the period of 31 years which spans from 1990 to 2020. The data used for the study were sourced from Global Financial Data and World Bank Data Indicator. The method of estimation is Autoregressive distributed lag (ARDL). The study found that banking sector development has a dynamic effect on climate change in Nigeria. Thus, it can be concluded that bank accessibility and depth are the most determinant of climate change in the long run while in the short run, the bank accessibility, depth, stability and efficiency significantly determined the climate change in Nigeria.in view of this, the study recommends that banks should minimize the rate at which enterprises have access to credit loan and this could be used to prevent the enterprises to reduce spending on carbon dioxide emitting product.

Keyword: Bank accessibility, bank depth, bank efficiency, bank stability, C02 emission.

1. Introduction

Growing greenhouse gas emissions are the cause of the issue known as global warming, which warms the world by trapping heat in the atmosphere and causing heat waves, melting glaciers, unusual weather patterns, and other impacts that become more significant and obvious. The most frequent greenhouse gas

associated with global warming is carbon dioxide (CO2), whose concentration in the environment may exceed certain thresholds and result in permanent effects that would be challenging to resolve in the future (IPCC 2014, 2018). Although there are several factors contributing to the rise in carbon emissions, the main one is the global improvement in life quality, which is linked to rising energy consumption in order to maintain all the prerequisites for a high-quality existence. As a result, numerous studies on the connection between environmental quality and economic growth have been published. This has led to environmental Kuznets curve (EKC) hypothesis proposed by Grossman and Krueger (1995) who are of the view that an inverted U-shaped relationship exist between the level of economic development and environmental quality. Many studies have validated the EKC hypothesis (Arouri, Ben-Youssef, M Henni & Rault, 2012; Ozturk, Al-Mulali & Saboori, 2016; Zaman, Shahbaz, Loganathan, & Raza, 2016; among others) however, some scholars have proposed doubts or opposite opinions (Farhani & Ozturk, 2015; Sterpu, Soava, Mehedintu, 2018;). Existing studies on carbon emission reduction have focused largely on the economic development aspect (Farhani & Ozturk, 2015). The problem of achieving a reduction in carbon emissions has also been examined in other energy economics patterns. Many academics have focused on the variables that affect carbon emissions, including trade openness, urbanization, and population expansion. Scholars have recently suggested that financial development is another major element that might have a large impact on carbon emissions, and that failing to consider this aspect could result in inaccurate empirical findings (Shahbaz, Tiwari & Nasir, 2013). As a result, researchers have carried out a number of studies using various methodology, indexes, and samples on the impact of financial. However, no definite conclusion has yet been drawn from these researches. Therefore, the goal of this study is to push the boundaries of knowledge beyond the development of the aggregate financial sector to that of the banking sector, with a focus on bank accessibility, depth, stability, and efficiency, as well as how these factors dynamically affect the climate. In light of this, the study's stated research question is: What dynamic impact does Nigeria's growing banking sector have on climate change?

In an attempt to fulfil the objective and answer the research question, the rest of this paper is arranged as follows: Section two provides a literature review, section three describes the methodology, section four provides results and discussion and section five details conclusion, recommendation, limitation of the study and further research direction.

2. Literature Review

The review of pertinent literature is included in this section, and it includes, but is not limited to, Ozturk and Acaravci (2013), who examined the relationship between financial development, energy consumption, economic growth, and carbon emissions for Turkey from 1960 to 2007 on an annual basis. The empirical estimates demonstrated that, over the long term, there is a relationship between financial development, income, carbon emissions, openness ratio, and energy consumption. However, in the case of Turkey, long-term changes in carbon emissions were negligible due to financial prosperity. The impact of globalization on India's environmental quality was studied by Shahbaz, Mallick, Mahalik, and Loganathan in 2015. The study, which employed the Vector Error Correction Model (VECM) methodology, supported the claim that India's financial development has a favorable effect on CO2 emissions throughout the forty-year period between 1970 and 2012. The study found that India's environmental quality is being negatively impacted by globalization. In the presence of EKC, Haseeb, Xia, Baloch, and Abbas (2018) evaluated the impact of financial development and globalization on CO2 emission. Fully modified ordinary least square (FMOLS) panel data were used in the BRICS-focused study to examine the relationship between domestic credit to the private sector and CO2 emissions in the BRICS countries from 1995 to 2014. The results showed that domestic credit to the private sector increased CO2 emissions. According to the study's findings, globalization and financial development have a substantial impact on carbon emissions.

The impact of urbanization, financial development, and income on carbon dioxide in Turkey was studied by Pata (2018). The study used three integrational vectors, and it was discovered that urbanization, financial development, and economic growth were all factors that were degrading the environment. Additionally, it was shown that carbon dioxide is unaffected by other energy sources. Thus, it was determined that economic expansion, followed by urbanization and financial development, is the key factor affecting carbon emissions. The FMOLS and ARDL models were used by Pata (2018), who discovered that financial development had a favorable effect on CO2 emissions in Turkey from 1974 to 2014. These research reaffirmed the significance of financial development in raising and enhancing the economic effectiveness of financial systems, which might impact economic activity and energy consumption and thus raise CO2 emissions. Park, Meng, and Baloch (2018) investigated the impact of information and communication technology (ICT), financial development, growth, and trade openness on CO2 emissions. The study used PMG estimations and data for selected European Union (EU) nations from 2001 to 2014. It was demonstrated that financial progress resulted in lower CO2 emissions. As a result, financial development may boost energy efficiency, resulting in lower energy consumption and CO2 emissions. Katircioglu and Katircioglu (2018) investigated the effect of

fiscal policy in the degradation of the ecosystem. Using the ARDL testing model, the researchers discovered that energy use increased CO2 emissions in Turkey. They argued that real income is the fundamental driver of energy consumption, and that policymakers in Turkey should increase and encourage energy efficiency in order to achieve long-term growth.

Samour and Isiksal (2019) evaluated the impact of banking sector development on CO2 emissions in Turkey from 1980 to 2014. To assess the coefficients between the variables, the Autoregressive Distributed Lag (ARDL), Fully Modified-OLS (FMOLS), and Canonical Co-integrating Regression (CCR) models are used. According to the report, the growth of the banking sector resulted in an increase in CO2 emissions. Furthermore, it was determined that an increase in interest rates would result in a reduction in CO2 emissions. This suggests that interest rates affect the cost of capital or the availability of credit, which in turn determines the level of savings and investment in an economy, which may have an impact on CO2 emissions. Thus, the study indicated that policymakers should use the banking sector development and interest rate channels to prevent environmental degradation by implementing monetary policy reforms, while simultaneously supporting energy investment and renewable energy generation. Jiang and Ma (2019) used a system generalized method of moments and data from 155 nations to investigate the relationship between financial development and carbon emissions. The study examined country disparities by categorizing the sample countries into two categories: developed countries and emerging market and developing countries. The GMM estimation techniques were used, and it was discovered that financial development could significantly increase carbon emissions. However, the findings indicated that the effect of financial development on carbon emissions is insignificant in developed countries. It was determined that merging market and developing countries should carefully balance financial development and environmental conservation, as financial expansion will increase carbon emissions before countries reach a relatively high degree of developmentZaidi, Zafar, Shahbaz, and Hou (2019) used continuously updated bias-corrected (CUP-BC) and continuously updated fully modified (CUP-FM) approaches to investigate the dynamic link between financial development and carbon emissions in the EKC framework. Panel data from 17 Asia Pacific Economic Cooperation (APEC) countries were employed, and panel data regression analysis was used for estimation. The study discovered that financial development could lower carbon emissions in both the long and short run. According to the study, financial development has an impact on carbon emissions.

Németh-Durkó (2020) conducted research and discovered that a developed financial system enhances the energy effect, which affects the environment

through energy consumption. According to the study, if an economy and loans grow too quickly, greater consumption and purchases will result in excess energy use, boosting carbon emissions despite improvements in unit energy efficiency. Amin, Ameer, Yousaf, and Akbar (2022) investigated the factors that influence CO2 emissions, focusing on the function of institutional quality. The dynamic autoregressive distributed lag simulations were utilized as an estimation tool in the study, which spanned the years 1996 to 2020. According to the study's findings, indicators of governance, trade, financial development, and renewable energy usage all have a negative impact on CO2 emissions, whereas urbanization and foreign direct investment both contribute to environmental degradation. Furthermore, it was discovered that the government should develop coherence between environmental and economic policies in order to prevent environmental degradation and attain environmental sustainability. The study indicated that viable financial institutions that focus on green growth by promoting clean manufacturing process solutions to reduce CO2 emissions can achieve low carbon emissions and sustainable development. Obiora et al. (2020) investigated the impact of banking and financial sector operations on carbon emissions in 45 nations. Between 1990 and 2017, the survey included developed, emerging, and developing countries. The panel data estimate models utilized in the study were Feasible General Least Squares, random effects with regard to the Durbin-Wu-Hausman test, and Difference General Method of Moments. It was discovered that increased domestic credit to the private sector and commercial bank lending consistently contribute to increased carbon emissions across all economic sectors. Furthermore, higher deposit rates in developing economies, higher loan rates in established economies, and higher deposit rates in emerging economies all lead to a reduction in overall carbon emissions. Based on the findings of this study, it was concluded that financial institutions in all economies should reduce lending to high-GHG emitting members of the private sector..

The studied literature makes it abundantly clear that the majority of these studies concentrated on financial development, with little attention on banking sector development. Furthermore, most of these studies used interest rate availability and lending to the private sector, among other things, to capture financial progress. In light of this, the current study differs greatly from the previous one in that it focuses on banking sector development and climate change. In addition, the prior study used banks' stability, accessibility, depth, and efficiency to represent banking sector development. As a result, the study hypothesizes the following effect of bank sector development on carbon emissions:
H0: banking sector development has significant dynamic effect on climate change in Nigeria.

Thus, in order to test the hypothesis with an emphasis on banks stability, accessibility, depth and efficiency in relation with climate change the study is anchored the environmental Kuznets curve (EKC) hypothesis.

3 Methodology

This section provides methodological procedure to examine effect banking sector development on climate change in Nigeria. Expo-factor research design was used and the study's population 24 banks that are currently functioning as at January, 2022 out of 25 mega banks that survived the recapitalization exercise in 2005 which is an off-shoot of 89 commercial banks operating during pre-consolidation in Nigeria. The study considered aggregate data of all the deposit money banks in Nigeria which covered the period 1990 to 2020. Data were obtained World Data Indicator (WDI, 2020) and Global Financial Data (GFD, 2020). The method of data analysis involved the use of dynamic tool which will capture both the short and long run effect of banking sector development on climate change in Nigeria. The model specification for this study was Autorregressive Distributed Lag model and it was specified below:

$$Cl_t = c_0 + c_2 ba_t + c_3 bd_t + c_4 bs_t + c_5 be_t + u_t \quad \text{.....3}$$

$$Cl_t = b_0 + \sum_{i=1}^{q^1} v_i cl_{t-i} + \sum_{i=1}^{q^2} c_i ba_{t-i} + \sum_{i=1}^{q^3} h_i bd_{t-i} + \sum_{i=1}^{q^4} g_i bs_{t-i} + \sum_{i=1}^{q^5} f_i be_t + w_t \quad \text{.....3}$$

$$q^1 = q^2 = q^3 = q^4 = q^5$$

$$i = 1, 2, ..., q^1$$

The first model specification shows the baseline between the banking sector development and climate change in Nigeria and this was transform to ARDL model in the second model specification. The cl represents the climate change, ba represents banks accessibility, bd represents banks depth, bs represents the banks stability, be represents banks efficiency, q is the lag length, u and w represents the error term. The model is limited to various conditions, which may include; symmetric condition must hold. That is the coefficients must significantly different from zero. Each of the coefficients must be greater than zero. None of the variables should be I(2) and the model is restricted to single equation approach to cointegration.

Table 3.1 Definition and measurement of Variables

S/N	Proxy	Variables	Measure ment	Source	A priori
	Co2 Emission	Dependent variables	Index	WDI (2020)	
	Bank Performance:	Independent variables	Index	Globabl financial	+/-

	Accessibility Depth Efficiency Stability	(i) Number of branches per 100000 adults (ii) Deposit money banks assets to GDP (iii) Bank lending Deposit spread (iv)Ratio of bank credit to bank deposit.		Data (2020)	

Source: Authors Computation, (2022)

4. Results and Discussion

This section focuses on how the to achieve an empirical stance on the link between banking sector development and climate change in Nigeria. In this regards, data were collected on the models formulated in section three and estimated to explain this phenomenon. The section is structured as description of data, pre-model estimation, estimated results, and post-estimation test results. The study described the data using mean, maximum, minimum, standard deviation, skewness, kurtosis, and Jarque-Bera statistics. The output of the descriptive statistics is presented in Table 4.1.

Table 4.1 Descriptive Statistics

Stat/Variables	STAB	ACC	C02	DEP	EFF
Mean	-0.000261	0.347050	-0.166246	1.129640	0.836970
Median	0.004964	0.000000	-0.181198	1.107554	0.868743
Maximum	0.122633	0.817194	0.000000	1.415098	1.043920
Minimum	-0.103399	0.000000	-0.317798	0.797890	0.000000
Std. Dev.	0.051945	0.368193	0.068217	0.163363	0.186841
Skewness	-0.020665	0.125198	0.664460	-0.197764	-3.081005
Kurtosis	2.591671	1.090723	3.735694	2.179953	14.33654
Jarque-Bera	0.217569	4.789550	2.980228	1.070687	215.0464
Probability	0.896924	0.091193	0.225347	0.585468	0.000000

Source: Output from E-view, (2022)

It is remarkable that the mean values are positive under the banks accessibility, efficiency, and depth while negative under the banks stability and carbon emission. The implication is that banks accessibility, efficiency and depth have increasing tendency during the sample period while the banks stability carbon emissions have decreasing tendency during the sample period. Looking at the standard deviation of these variables, banks accessibility has the largest value while banks stability has the lowest value among the variables and this suggest

that banks accessibility is the most volatile among the variables while the banks stability is the least volatile among the variables and this implies that these variables are negatively skewed and as such, they exhibit large values over a long portion of the sampling period. Also, the scores of skewness show that banks stability, depth and efficiency are negatively skewed while banks accessibility and carbon emission are positively skewed and this implies that large values over a short period. The values of kurtosis that is lesser than 3 shows that banks stability, accessibility, depth are plytokurtic while carbon emission and banks efficiency are leptokurtic. Finally, the probability values corresponded to JB statistics with respect to all the variables are larger than 5 percent except banks efficiency. This implies that these variables are normally distributed and hypothesis of normality is rejected except the banks efficiency. The study proceeds to examine the stationarity of the variables under the Augmented Dickey Fuller and Philip Peron techniques. The result is presented in the Table 4.2

Table 4.2 Unit Root Test

Variables	**ADF-Stat**		**PP-Stat**	
	Int. Order			
D(C02)		-4.790859		-
4.790859	I(1)			
		(0.0006)		
(0.0006)				
D(ACC)		-5.278196		-
5.277664	I(1)			
		(0.0002)		
(0.0002)				
D(DEP)		-4.477685		-
4.516224	I(1)			
		(0.0014)		
(0.0012)				
D(EFF)		-3.233638		-
3.002172	I(1)			
		(0.0281)		
(0.0465)				
STAB		-4.084490		-3.356393
I(0)				

(0.0040)

(0.0210)

Source: Authors Computation, (2022)

The analysis under ADF and PP unit root tests are conducted to authenticate the order of integration of each variable. The null hypothesis here is that the series is not station stationary or the series has a unit. The hypothesis is rejected, if the ADF-statistic and PP- statistics are larger than the associated critical values at 5 percent in absolute form or the associated probability values are less than 5 percent (0.05). The result shows that the associated P-values of ADF and PP statistics are lesser than 5 per cent for the carbon emission, accessibility, depth and efficiency at the first difference while the associated P-value of ADF and PP statistics for stability are less than 5 percent at level. Thus, this implies that carbon emission, accessibility depth and efficiency are stationary at first difference or are simply 1(1) variable while the stability is stationary at level. Based on this mix stationary, the meaningful technique for estimation is autoregressive distributed lag. This study proceeds to examine the correlation among the independent variables and the result is presented in the Table 4.3.

Table 4.3 Correlation Matrix

	STAB	ACC	DEP	EFF
STAB	1	-0.0883	-0.1350	-0.1602
ACC	-0.0883	1	0.7879	0.1496
DEP	-0.1350	0.7879	1	-0.0236
EFF	-0.1602	0.1496	-0.0236	1

Source: Authors Computation, (2022)

The first column of table 4.3 shows the correlation coefficients in-between each peer of the variables-accessibility, depth, efficiency and stability. The first peer has the correlation coefficient of -0.0883, the second has -01350 and the third has -0.1602. This means banks stability and banks accessibility moves in the opposite direction, banks stability moves in opposite direction with banks depth and banks stability and banks efficiency moves inversely with each other. The second column shows the correlation between banks accessibility, stability, depth and efficiency. The coefficient of correlation between the banks accessibility and banks stability has negative co-efficient correlation and this implies that banks accessibility moves inversely with banks stability while the banks accessibility moves linearly with banks depth and banks efficiency. In the third column, the correlation between banks depth and banks stability are

negative and this denotes that the banks depth moves in opposite direction with the banks stability. Also, the banks depth and banks efficiency moves in opposite direction while the banks depth and banks accessibility moves in the same direction. The fourth column reveals that banks efficiency moves in the same direction with banks accessibility while banks efficiency moves in the opposite direction with banks stability and banks depth. Thus, the result suggests that each peer of the variables is not perfectly correlated, and as such, the assumption of multicollinearity or perfect collinearity is refuted. The study proceeds to estimate the ARDL model but starting with the pre-estimation model such as model selection. The figure below presents the model selection and ergodicity test for the mole selected for ARDL model.

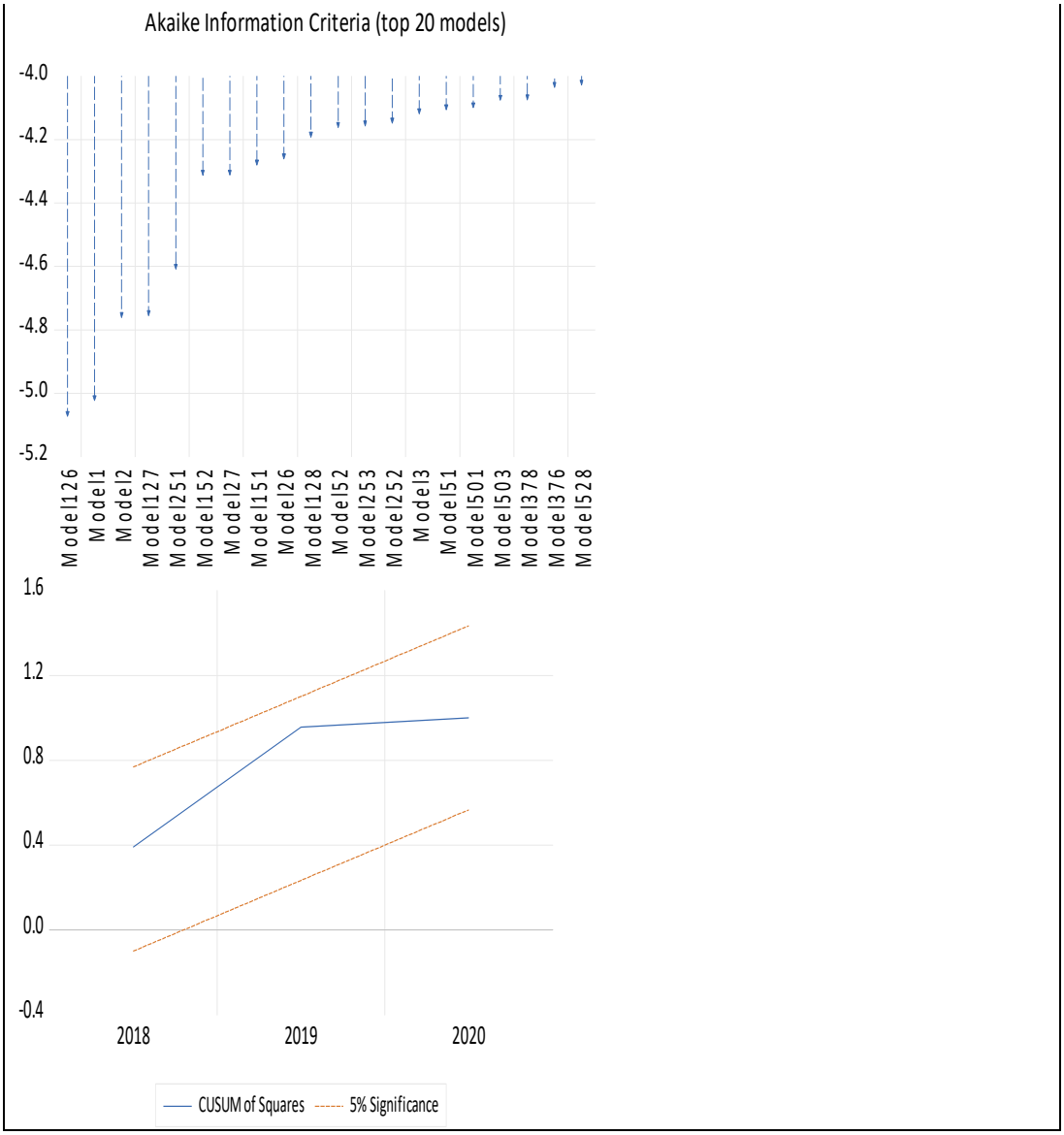

Figure 4.1 Optimum model selection and ergodicity graph
Source: Output from E-view, (2022)

The output in the figure shows that the top 20 ARDL models and the graphical output of the ergodicity test. The smallest AIC value is -5.1. This can be traced to ARDL(1,4,4,1). Therefore, the optimum ARDL model is the ARDL with order 1,4,4,1. Also, the result of the ergodic shows that the model is stable or egordic. This conforms to the good specifications for cointegration test that is need for this study. The study presents the result of the autocorrelation test and bound test in the Table 4.4.

Table 4.4 Autocorrelation and Bound Test

Panel A				
Statistics	AC	PAC	Q-stat	Prob.
Q-stat (lag 10)	0.016	-0.129	10.923	0.364
Panel B				
Test Statistic	Value	Signif.	I(0)	I(1)
F-stat	2.597151	5%	2.2	2.59

Source- Authors Computation, (2022)

In Panel A, the result revealed that the p-values associated with the Q statistics from lag 1 to 10 are in each case greater than 5 percent alpha value, suggesting that hypothesis of no autocorrelation is not rejected. The model is appropriate based on the autocorrelation test. Also, the panel B reveals that As shown in the table the F statistic is 2.597151, the lower bound I (0) values at 5 percent for the asymptotic sample is 2.2 and the upper bound 1 (1) at 5 percent for the asymptotic sample is 2.59. It seems good that the F statistic exceeds both the lower and upper values and that implies there is existence of cointegrating relationship between climate change and banking sector development in Nigeria.

4.1 Long run Multiplier Effect

Having indicated that long run relationship exists between climate change and banking sector development. This serves as a background to test the hypotheses whether there are positive or negative multiplier effects from the set of the covariates to the explained variable in the model. The test results are reported in Tables 4.5

Table 4.5 Long-run Multiplier Effect

Variable	Coefficient	Std. Error	t-Statistic	Prob.
STAB	0.275071	0.129237	2.128421	0.1232
ACC	0.093752	0.027969	3.351983	0.0440
DEP	-0.482665	0.060610	-7.963419	0.0041
EFF	-0.062650	0.124362	-0.503774	0.6491
C	0.391620	0.116995	3.347337	0.0441

Source-Authors Computation, (2022)

Table 4.5 shows that coefficients of banks stability and accessibility are approximately 0.28 and 0.09 respectively; with corresponding probabilities of 12% and 4%. This implies that positive multiplier effects run from banks stability and accessibility to carbon emission in the long-run. Specifically, a 1 percent change in banks stability induces carbon emission by 28 percent. While a 1 percent rise in banks accessibility leads to 9 percent increase in carbon emission. However, banks stability does not have significant long run multiplier

effect on carbon emission but banks accessibility does on carbon emission. On the other hand, the coefficients of banks depth and efficiency have negative multiplier effect on carbon emission. A 1 percent decrease in the banks depth leads to 48 percent significant increase in carbon emission while a 1 percent decrease in banks efficiency leads to 6 percent increase in carbon emission. Evidence from the result shows that carbon emission is mostly driven by banks accessibility and depth in the long-run rather than banks stability and efficiency. Also, it is explicit that in the long-run, the magnitude of impact of banks accessibility on carbon emission is stronger than that of banks depth. In spite of this, the study proceeds to examine the short run dynamic relationship between the banking sector development and climate change.

4.2 Short Run Dynamic

It has long been discovered that within the purview of the short run situation, variables are not static rather dynamic because their present values depend on the previous values. Based on this stylized fact, the researcher attempts to investigate the short run dynamic relationship between the covariates and explained variable of the model specified for this study. Therefore, Table 4.6 reports the results of the short run dynamics and the adjustment parameter.

Table 4.6 Short Run Dynamic

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(C02(-1))	3.231680	0.460127	7.023457	0.0059
D(C02(-2))	1.828160	0.279564	6.539328	0.0073
D(C02(-3))	1.153321	0.155580	7.413025	0.0051
D(STAB)	0.187870	0.091055	2.063265	0.1311
D(STAB(-1))	-0.785358	0.099162	-7.919974	0.0042
D(STAB(-2))	-0.440765	0.090782	-4.855201	0.0167
D(ACC)	-0.012233	0.021927	-0.557887	0.6158
D(ACC(-1))	-0.176017	0.047739	-3.687083	0.0346
D(ACC(-2))	-0.345509	0.043553	-7.933108	0.0042
D(ACC(-3))	-0.200716	0.047570	-4.219347	0.0243
D(DEP)	0.079423	0.094392	0.841421	0.4619
D(DEP(-1))	0.598279	0.151340	3.953202	0.0289
D(DEP(-2))	0.797873	0.124394	6.414083	0.0077
D(DEP(-3))	0.790934	0.091135	8.678745	0.0032
D(EFF)	-0.065619	0.039887	-1.645133	0.1985
D(EFF(-1))	0.157626	0.039018	4.039854	0.0273
D(EFF(-2))	-0.171605	0.028324	-6.058636	0.0090
D(EFF(-3))	0.129366	0.041260	3.135378	0.0518

CointEq(-1)*	-3.147230	0.488225	-6.446272	0.0076

Source-Authors Computation, (2022)

It is explicit from the result that the error correction parameter is negative and significant at 5 per cent which conform to a priori and this implies that there is long run causality from banking sector development to climate change in Nigeria. The coefficients of previous value of carbon emission from lag 1 to 3 are positive and significant at 5 percent and this suggests that previous decline or rise in the carbon emission significant influenced the present carbon emission in Nigeria. However, the coefficient of banks stability at lag 1 and 2 have negative but significant effect on carbon emission in Nigeria while the present value of the banks stability has positive and significant effect on carbon emission in Nigeria in the short run. The coefficients of banks accessibility from lag 1 to 3 have negative but significant effect on carbon emission while the value of banks accessibility has negative and insignificant effect on carbon emission in the short run. The output of the result shows that the coefficient of banks depth from lag 1 to 3 positive and significantly influenced the carbon emission in Nigeria in the short run while the present value of banks depth has positive but insignificant effect on carbon emission in Nigeria. The present value coefficients of banks efficiency shows that it has positive but insignificant effect on carbon emission in Nigeria while the lag 1 and lag 3 coefficient values reveal that banks efficiency is positive and significantly influenced the carbon emission in Nigeria. On the other hand the coefficient at lag 2 reveals that banks efficiency is negative but significantly influenced carbon emission in Nigeria.

4.3 Discussion of Findings

It was found that banks stability has positive but insignificant effect on carbon emission in the long run but in the short run, the banks stability has negative but significant effect on carbon emission. This implies that the relative stability of banks greatly enhances the confidence of enterprises and consumers and stimulates the activities of production and consumption, therefore leading to the increase of energy consumption and carbon emissions. The findings of the study conform to the findings of Németh-Durkó (2020). Also, banks accessibility has positive and significant effect on carbon emission in the long run but in the short run, banks accessibility has negative but significant effect on carbon emission. This suggests that in the long run, accessibility to better services of banks could provide more credit consumption to enterprises which facilitates their intertemporal consumption and encourages them to purchase more commodities such as properties, automobiles, and other electric appliances. These would dramatically promote the expansion of social consumption and further increase carbon emissions. The study conforms to the findings of Jiang and Ma (2019). On the other hand, the banks depth has negative but significant effect on carbon

emission in the long run but in the short run, banks depth has positive and significant effect on carbon emission. The implication of this is that an increase in the banks branches to enable the enterprises to obtain lending capitals which could facilitate their expansion of the production scale (such as building a new production line, renting more equipment, and employing more workers), and therefore significantly increase carbon emissions in the long run. This is in tandem with the findings of Pata (2018), Haseeb, Xia, Baloch and Abbas (2018) among others. In addition, in the short run the study conform to the findings Zaidi, et al.(2019). More so, banks efficiency leads insignificant increase in carbon emission in the long run but in the short run, the banks efficiency has significant positive and negative effect on carbon emission. This partially conform to the findings of Obiora, et al. (2020) who documented that banks efficiency through increased deposit rates, increased lending rates and increased deposit rates spur carbon emission.

5. Conclusion and Recommendation

The study investigates the dynamic effect of Nigeria's banking sector development on climate change. It was discovered that the development of the banking industry had a dynamic effect on climate change in Nigeria. Thus, in the long run, banks accessibility and depth are the most important determinants of climate change, and in the short run, banks accessibility, depth, stability, and efficiency are important determinants of climate change in Nigeria. In light of this, the report suggests that banks lower the rate at which businesses can obtain credit loans, which might be used to dissuade businesses from cutting back on expenditure on carbon-emitting products. One of the study's drawbacks is that the data accessible is only up to the year 2020, and the most recent data on carbon emissions has not yet been published. As a result, the study's findings are unaffected. According to the report, future research should compare the impact of banking sector development on climate change in Nigeria to that of other Sub-Saharan African countries.

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