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IMPACT OF GREEN FINANCING ON ECONOMIC SUSTAINABILITY IN NIGERIA

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ABSTRACT

The study analysed how green financing affects Nigeria's long-term economy from 1986 to 2023. The autoregressive distributed lag (ARDL) model as estimated technique, the result revealed that green bonds have negative and long-term effect on the human development index (-0.238177, 0.7947). Green investments was negative and insignificant long-term impact on the human development index (-3.674105, 0.7564), while green loans was negative and insignificantly impacted on human development index in Nigeria (-0.064880, 0.9421) and concluded that green finance indices a negative and insignificant influence on Nigeria's economic sustainability in Nigeria in the long run. To increase green finance, the government should reinvigorate the green bond market, cut loan interest rates, and stimulate private sector green projects.

Keywords: Green Bond, Green Loan, Green Investment and Human Development Index

Introduction

Sustainable finance is soon becoming a policy priority (Ranjan, Ghosh & Nath, 2021). Joel and Efosa (2024) define "green finance" as funding mechanisms that assist ecologically friendly or climate-change-fighting initiatives. Green finance aims to boost economic growth and protect the environment (Joel & Efosa, 2024). Wang and Zhi (2016) define "green finance" as financial activities that profit and safeguard the environment. These concepts show how green finance supports environmentally conscious activities and operations, ensuring that firms do not harm the environment for profit. Green financing has several benefits, the report says. Green financing aids smart city development, according to He et al. (2020). Green financing may dramatically cut funding for ecologically detrimental operations (Sachs et al., 2019a). Carbon dioxide emissions can be reduced. Recently developed green financing tools include green bonds, community-based green funds, green bond grant schemes, green blended finance instruments, and central bank-issued digital currencies. Berensmann

and Lindenberg (2016) suggested greater transparency laws, incentives for green investments and finance, and governmental coordination to enhance eco-friendly project funding. Green bond markets need low interest rates, good monetary policies, and strong regulation. Taghizadeh-Hesary and Yoshino (2019) offered green credit guarantee programs and tax incentives for green investors to promote private sector green funding. New green financing projects in Nigeria are driven by sustainable growth and environmental conservation. Green financing includes renewable energy, energy efficiency, and sustainable agriculture (Onuoha, 2019). However, uneven laws and poor financing impede wider use (Iweala & Odigbo, 2021). Green finance is being integrated into the National Climate Change Policy to assist low-carbon development and environmental resilience (Federal Ministry of Environment, 2013). Ozili (2024) recommends a comprehensive green finance plan to prepare Nigeria's financial sector for climate change. Green finance promotes economic growth and environmental protection (Wang and Zhi, 2016). Green finance's ability to reconcile environmental protection and economic growth has been extensively studied. These studies have two primary schools of thought. One school of thought says green finance slows the economy (Wei & Jinhua, 2014), while the other says it enhances growth and asks for stronger green financing systems (Haiyang, 2017). The literature favours the second school. Green finance may boost economic growth, address environmental challenges, and be similar to traditional finance, according to Wang, Tsai, Du, and Bi (2019); Chen, Zhang, Bai, and Li (2021); and He, Liu, Zhong, Wang, and Xia. Research supports using green funding to meet the SDGs (Dabyltayeva & Rakhymzhan, 2019; Taghizadeh Hesary & Yoshino, 2019). This study's key findings show that the public sector has helped green investment. Few studies have examined how green finance influences economic growth, while many have examined fiscal development and growth. Economic and financial uncertainty makes green funding harder. Nigeria might use green financing to attract green investments, promote clean technology innovation, and boost environmental resilience (Shobanjo, 2022). Green financing in Nigeria has great promise, but there are many obstacles to overcome. These include stakeholder confusion, regulatory gaps, and financial obstacles. Due to its substantial reliance on oil exports, Joel and Efosa (2024) opined that Nigeria's economy is very sensitive to global market changes. In addition, stakeholders' lack of understanding, inconsistent legislation, insufficient institutional capacity, and inadequate funding structures hinder effective green finance that may assist sustainable development in the country and that the impact of globalisation and green financing on Nigeria's sustainable development is uncertain. Since green financing is new in Nigeria, there are little statistics on it and sustainable development and green finance have gotten little empirical research in Nigeria. Joel and Efosa (2024) found that green bonds (GB) and the all-share index (ASI) promote green infrastructure development in Nigeria, whereas agricultural contribution to GDP (AGRIC/GDP) and market capitalisation (MCAP) hinder it. According to Akerele, Okeme, and Amadi (2024), green financing is essential to Nigeria's economic growth over the long run. Grant-financed green finance investments correlated positively with GDP, whereas debt-financed investments correlated negatively.

In light of the preceding, this study investigate impact of green financing on economic sustainability in Nigeria.

Literature Review
Conceptual Literature
Green Finance

Green finance includes eco-friendly loans, credit cards, insurance, and bonds. Green funding has grown due to a more progressive financial structure. Noh (2010) and Hyomnyoktan (2012) say green finance is a major element of the financial system and originates from local and international public and private sources. These sources benefit every economy's financial system. Wang, Tsai, Du, and Bi (2019) describe green finance as a financial innovation and policy instrument for environmental challenges. Green financing resembles conventional finance in many respects. Green investments and loans, such as creating green infrastructure or buying sustainable products, are called "green finance" (Joel & Efosa, 2024). Growing worries about the environmental effect of consumer decisions are driving "green financing" to the mainstream. Green loans can only be used for environmentally beneficial projects. Green loans and financing provide funds for eco-friendly enterprises like green bonds. Green loans, which are smaller than bonds, are usually private. Green bonds can be traded publicly or privately, have a larger volume, and have higher transaction fees. The International Capital Market Association (ICMA) Green Bond Standards (GBP) and Green Loan Principles apply to green bonds and loans. Both agreements require that all earnings go to environmentally beneficial initiatives that satisfy the standards (World Bank, 2021).

Sustainable Finance

Sustainable finance, according to the European Commission, is the integration of environmental, social, and governance (ESG) issues into financial sector investment decisions to promote long-term investments in sustainable economic activities and initiatives (Shobanjo, 2022). Three trends may improve the sustainable investment market (SIM), according to UNCTAD (2024). Sustainable investing will transition from a "market niche" to the market standard due to global sustainability integration. The plan includes strengthening sustainability reporting and ratings through strong regulatory standards and expanding Sustainable Investment Management (SIM) from a problem for developed countries to a global market that benefits all nations, especially developing ones (Shobanjo, 2022). Sustainable finance projects in Nigeria emphasise social inclusion, environmental protection, and equitable economic growth. Poverty, inequality, and environmental degradation remain despite abundant natural resources (UNDP, 2022). By enhancing access to healthcare, education, and clean water, the National Environmental Policy (Federal Ministry of Environment, 2013) advances environmental sustainability. Sustainable development calls for overcoming institutional capacity deficits and encouraging inclusive economic growth that benefits everyone (Ajide & Odusanya, 2020).

Human Development Index

The UN Development Program (2017a) bases the Human Development Index on three metrics: the average lifespan of a population at birth, the level of education of that population, including children and adults, and the level of living standards, as measured by real GDP per capita. Ranis and Sewart (2004) used human development and human capital interchangeably to illustrate a two-way interaction between economic growth and human development. Human progress, including economic prosperity, is paramount. However, development specialists still view GDP growth as the goal and the measure of success (Solow, 1956). Human development has numerous components, but increasing the economy is a clear and feasible goal (Sala-i-Martin & Pinkovskiy, 2010). After the UNDP and OECD had concentrated on economic growth and GDP per capita, human development became the main yardstick for global development in the 1990s. Nigeria's Poverty Capital status and pervasive economic inequality suggest that the country is falling short in human development and far from meeting the Sustainable Development Goals (World Bank, 2022).

Theoretical Review
Dependency Theory

In the 1960s, academics like Andre Gunder Frank created dependence theory to emphasise poor nations' structural disadvantages in the global economy. According to Dar, Otapo, Demehin, and Ushie (2024), poor countries like Nigeria are largely engaged in the world economy as providers of low-cost labour and raw resources, hence relying on developed countries for technology, investments, and market access. Their requirement prevents self-sustaining growth (Frank, 1966). Dependency theory illuminates Nigeria's history of oil exports. Even though Nigeria is Africa's largest oil producer, its economy is exposed to external shocks due to oil price instability and a lack of diverse industries (Ajide & Odusanya, 2020). This single commodity's reliance restricts Nigeria's ability to engage in other industries and sustainable practices, illustrating dependency theory's limitations in sustainable development.

Priority Theory of Green Finance

This theory states that a country or area prioritises green finance if its economic players strive hard to accomplish sustainable or green finance goals (Wilson 2010). The priority may be measured by (i) consensus achievement, (ii) green finance goal action, and (iii) economic actors' coordination, autonomy, or collaboration. Different economic players may have opposing agendas. Priorities can be arranged descendingly. Green infrastructure development can help solve urban and climate change problems according to the priority theory connection of this study if the government and regulatory

authorities give green finance-loans, bonds, or investments top priority to support projects that support environmentally friendly activities like purchasing sustainably sourced goods and services. Low-carbon infrastructure will comprise renewable energy systems, public transportation networks, stormwater management, climate adaptation, heat stress mitigation, biodiversity enhancement, food production, better air quality, sustainable energy generation, clean water, and healthy soils (Shinde, 2023). This positive effect on their share price will increase eco-friendly firms' market capitalisation rates.

Peer Emulation Theory of Green Finance

If this is true, economists will do what they do best like their green finance counterparts. It allows prominent economic actors to discuss green finance solutions that match their social, economic, and political values. Peer emulation theory helps green finance policies and projects be implemented fast and with little revisions. Without universal green finance requirements, the peer emulation hypothesis asserts that economic players would copy their recognised contemporaries' actions and policies. This argued that economic players will aim for green finance goals since their counterparts are or have done so. Economic players should emulate their colleagues if they share sustainability views, according to Cowett (2008). Comparable climate change perspectives will lead to comparable green financial goals and sustainable finance legislation and initiatives in two nations.

Empirical Review

Examining 26 OECD countries from 2000 to 2018, Zakari (2022) looked at how green money influences sustainable economic and environmental development. Given that macroeconomic data is one-of-a-kind, this paper tackles data imbalance and autocorrelation using a fixed effects autoregressive model. The regression results imply that green spending significantly improves long-term environmental and economic progress. The research discovered that only with a robust green financial market, system, and quicker building of green financial frameworks in poor places could green finance advance. By 2030, these strategies might assist to meet the SDGs.

From 1995 to 2022, Joel and Efosa (2024) looked at how green funding affected Nigeria's green infrastructure growth. Dynamic least squares (DOLS) econometrics were employed in this estimation. While agricultural contribution to GDP (AGRIC/GDP) and market capitalisation harm it, green bonds (GB) and the all share index (ASI) promote green infrastructure development in Nigeria. Therefore, to bring back the green bond market and draw more investors, the government should improve the green finance system by creating appropriate laws.Dare, Otapo, Demehin, and Ushie (2024) studied the environmental (CO2 emissions) and social (life expectancy) implications of globalisation and green funding on SDG achievement from 2012 to 2022. The Generalised Method of Moments (GMM) analysis shows that net foreign portfolio investment is the only globalisation component that significantly influences CO2 emissions (coefficient = 0.000135; p = 0.0002). All other globalisation

variables were ineffective. Thus, authorities should prioritise globalisation components that significantly cut CO2 emissions. A comprehensive CO2 emission reduction plan requires globalisation and non-globalization policies. Along with adjusting globalisation and green finance policies to improve life expectancy, governmental and private investments in renewable energy projects and green bonds would be advantageous.

Akerele, Okeme, and Amadi (2024) examined green finance's influence on Nigeria's sustainable development from 2000 to 2020. Green financing is vital to Nigeria's economic development, according to the study, which employed the vector error correction mechanism (VECM) to estimate variables and discovered a strong long-term association. The cointegration equation showed a favourable link between GDP and grant-funded green finance initiatives. However, debt-financed green finance had a short-term negative association, although it was not statistically significant. Governments and international organisations should expand green grant programs and funding pools. To successfully manage and execute green financing, Nigeria must develop its institutional capacity, create a suitable atmosphere for private sector green investments, and emphasise openness and accountability.

Research Method

The model for this study is buildt base on the modification of the study of Akerele, Okeme and Amadi (2024) which is stated in a linear form as;

HDI = f(GBD, GL,GINV) …… 1

In a bid to bring data to a common base, the model is lognarized and stated below as;

$LogHDI = \beta_0 + \beta_1 LogGBD + \beta_2 LogGL + \beta_3 LogGINV + \mu$ …… 2

Where;

HDI = Human Development Index

GBD = Green Bond

GL = Green Loan

GINV = Green Investment

β_0 = Constant Parameter

β_1- β_5 = coefficient of variables

Data Analysis and Interpretation

The Auto Regressive Distributed Lag (ARDL) model was used to evaluate green finance's long-term effects on Nigeria's economic sustainability from 1986 to 2023, considering multiple integration orders. In the study's research model, green bonds (GBD), loans (GL), and investments (GINV) were explanatory variables while the Human Development Index (HDI) was a proxy for economic sustainability. ARDL analyses both long-term and short-

term impacts, which the OLS approach seeks to represent, hence the Unit Root Test will be used to understand the results. Interpreting and analysing study results takes up this entire section.

Data Presentation

The study's raw and log-linearized data were secondary data ranging from 1986 to 2023 carefully examined and are appropriately presented as shown below

Test for Stationary of Variables (Unit Root Test)

Often thought, time series data tend to be stationary, hence the Augmented Dickey-Fuller Unit Root Test (ADF URT test) is required to verify the stationarity of the data. The test is run to address the issue of false regression. The following hypothesis is applied to investigate if the study model variables are stationary:

H_0: X has a unit root i.e. data is non-stationary

H_1: X has no unit root i.e. data is stationary

Decision Rule:

The absolute value of the ADF test results must be larger than the 5% Mackinnon Critical Value for a variable to remain stationary, regardless of sign. The alternative hypothesis (H1) is rejected if H0 is accepted. The Augmented Dickey Fuller Unit Root test as duly presented in table D in the appendix is summarized in table 4.1 and 4.2 below

Table 1: Result of ADF Unit Root Test at Level

Variable	ADF Statistical value	Mackinnon Critical Value	H_0	H_1	Remark
LNHDI	-4.139531	-2.943427	Reject	Accept	Stationary
LNGBD	-0.939520	-2.948404	Accept	Reject	Non-Stationary
LNGL	-2.033455	-2.943427	Accept	Reject	Non-Stationary
LNGINV	-1.684097	-2.948404	Accept	Reject	Non-Stationary

Source: Author's computation using E-views 10 (2025)

The table 1 above shows that LNHDI was stationary before first differencing since its ADF statistic exceeded the Mackinnon critical value of 5%. For LNHDI, I reject the null hypothesis and embrace the alternative. Since other variables were non-stationary, differencing must be done first to obtain stationarity. Thus, the table below accurately shows the original discrepancy.

Table 2: Result of ADF Unit Root Test at First Difference

Variable	ADF Statistical Value	Makinnon Critical Value	H_0	H_1	Remark
D(LNGBD)	-5.501226	-2.951125	Reject	Accept	Stationary
D(LNGL)	-6.487507	-2.948404	Reject	Accept	Stationary
D(LNGINV)	-10.08332	-2.948404	Reject	Accept	Stationary

Source: Author's computation using E-Views 10 (2025)

The table 2 shows that LNGBD, LNGL, and LNGINV are stationary at the first difference because the ADF statistics exceed the MacKinnon critical value at 5% significance. Thus, we reject the null hypothesis and accept the alternative hypothesis for variables.

Summary of Order of Co-integration

Table 3 below shows the Augmented Dickey Fuller (ADF) unit root test summary:

Table 3: Summary of Order of Integration

Variable	Order of Integration
LNHDI	I(0)
LNGBD	I(1)
LNGL	I(1)
LNGINV	I(1)

Source:- Author's computation using E-view 10 (2025)

As shown in Table 3, due to the unusual order of integration, the Auto Regressive Distributed Lag (ARDL) model is needed to assess the long-term association between variables instead of the co-integration test.

ARDL Bound Test Approach to Co-integration

The study used Pesaran, Shin, and Smith (2001)'s limits testing technique to the ARDL framework and examine co-integration to find long-term equilibrium. Hypothesis for this study:

H_0: There is no co-integration among variables

H_1: There is co-integration among variables

Decision Rule:

To prove co-integration, the F-Statistics of the model at the 5% significance level must surpass the upper limit of the test outcome. At the 5% significance level, F-Statistics over the upper bound accept the alternative hypothesis, which indicates co-integration across variables throughout time. So the null hypothesis is accepted. The co-integration findings are shown in Table 4. Using the Schwarz Information Criterion, researchers selected the ARDL (1, 0, 1, 1, 0, 1) model.

Table 4.: Co-Integration Result

F-Statistics	Lower Bound (5%)	Upper Bound (5%)
32.20187	2.79	3.67

Source: Author's Computation using E-views 10 (2025)

Since the F-Statistics exceed the upper limit at the 5% critical value, null hypothesis is rejected and determine that the variables are in stable long-run equilibrium.

Long Run Result

The long run outcome of the model acquired using the ARDL approach as shown in table 4.6 is summarised below:

Table 5: Long Run Result of the Model

Dependent Variable: LNGDP

Variable	Coefficient	Std. Error	T-Statistics	Prob.
LNGBD	-0.238177	0.907397	-0.262484	0.7947
LNGL	-0.064880	0.886153	-0.073215	0.9421
LNGINV	-3.674105	11.73842	-0.312998	0.7564

Source: Author's Computation using E-views 10 (2025)

From the table 5 above, the long run equation specifying the long run relationship among the variables can be presented below as:

$$HDI = 52.92994 - 0.238177_{GBD} - 0.064880_{GL} - 3.674105_{GINV} + \mu$$
$$(114.7896) \quad (0.907397) \quad (0.886153) \quad (11.73842)$$

Note: The standard error statistics are those stated in parenthesis

The long-run equation demonstrates that green bonds have a negative and statistically insignificant relationship with HDI, calculated as -0.238177 units. A unit increase in green loan will lead to a corresponding reduction in HDI over time, as the two have a negative and statistically insignificant relationship (-0.064880). Finally, a correlation of -3.674105 units was established between green investment and HDI, implying that a one-unit increase in green investment will lead to a one-unit reduction in HDI over time, but this is not statistically significant.

Test for Statistical Significance of Parameters in the Short Run (Probability Test)

This study examined the research variables for statistical significance using the probability values from the ARDL long-run findings. This is done by considering the probability value attached to the variables as presented in the ARDL short run result.

Decision Rule:

A variable is deemed statistically unimportant if the probability value linked to it is not less than 0.05, or 5% significant.

Table 6: Probability Test Long Run

Independent variable	Coefficient probability	Probability value	Decision
LNGBD	-0.238177	0.7947	Insignificant
LNGL	-0.064880	0.9421	Insignificant
LNGINV	-3.674105	0.7564	Insignificant

Source: Author's Computation using E-views 10 (2025)

The table 6 shows that LNGBD, LNGL, and LNGINV have a minor long-term effect on HDI. Long-term results showed that environmentally friendly investments, loans, and bonds hurt the HDI.

Diagnostic and Stability Test

Diagnostic and stability tests using various methods examine the model for robustness, stability, and dependability. Diagnostics include normality, heteroskedasticity, and serial correlation or autocorrelation testing.

Serial Correlation Test

Breusch-Godfrey Serial Correlation Lagrange Multiplier (LM) was used to determine residual autocorrelation or serial correlation. LM test evaluates error autocorrelation thoroughly (Asteriou & Hall, 2011). This study tests serial correlation using the following premise.

H_0: There is no serial correlation

H_1: There is serial correlation

Decision Rule:

Should the F-Statistic's probability value (P-Value) exceed 5%, there is no serial connection and the null hypothesis is accepted; if not, the alternative hypothesis is accepted.

Table 7: Result of the Breusch-Godfrey Serial Correlation LM Test

F-Statistics	0.940612	Prob. F(2,29)	0.4020
Obs*R-squared	2.193050	Prob. Chi-Square(2)	0.3340

Source: *Eviews 10* (2025)

Table 7 shows that P-Value is over 5% at 0.3340, and F-Statistics is 0.940612. The null hypothesis predicts auto-correlation, but this indicates otherwise. The model may be used to make realistic policy suggestions and draw conclusions.

Heteroskedasticity Test

Heteroskedasticity tests are typical data analysis issues. Testing for heteroskedasticity is important since the predicted standard error might be very big or little. When error variance fluctuates across observations, heteroskedasticity arises. Thus, inaccurate judgements may follow (Hendry, 1995). This idea underpins the heteroskedasticity test:

H_0: There is no heteroskedasticity in the model

H_1: There is heteroskedasticity in the model

Decision Rule:

An F-Statistics probability value more than 5% indicates that the study is heteroskedasticity-free; less than 5% accepts the alternative hypothesis.

Table 8: Breusch-Pagan-Godfrey Heteroskedasticity Test Result

F-statistic	1.258775	Prob. F(4, 31)	0.3071
Obs*R-squared	5.030196	Prob. Chi-Square(4)	0.2842
Scaled explained SS	7.193332	Prob. Chi-Square(4)	0.1260

Source: *Eviews 10* (2025)

According to the white heteroskedasticity test as shown in table 8, F-Statistic = 1.258775, p = 0.3071 (>5% likelihood). Therefore, we accept the null hypothesis that there is no heteroskedasticity, meaning our model is heteroskedasticity-free.

Normality Test

Hair (2010) recommends a linear, normally distributed model for resilience. The Jarque-Bera statistic from the normality test verified the variables' normality. This hypothesis will lead the test:

H_0: Data is normally distributed

H_1: Data is not normally distributed

Table 9: Normality Test Result

Jarque-Bera	10.19994	Prob. Value	0.006097
Skewness	0.915325		

Source: *Eviews 10* (2025)

Table 9 shows normality test results. The Jarque-Bera statistic is 10.19994 and the probability 0.006097. Accepting the null hypothesis means the model has a normal distribution. The skewness number is -1 to +1, indicating a normal distribution.

Summary of the Research Findings

The Augmented Dickey-Fuller Unit Root Test showed all variables stationary at the first difference except the HDI. The Auto Regressive Distributed Lag (ARDL) approach found integrated variables' long-term equilibrium relationship after stationarity adjustment. Long-term ARDL co-integration showed substantial connections. GBD, GL, and GINV negatively affect the ARDL long-run model human development index, although not statistically. All variables will match a priori assumptions, as stated. Diagnostic and performance tests assessed model stability and dependability.

Implications of Research Findings

This study examined impact of green financing on economic sustainability in Nigeria. The Auto Regressive Distributed Lag (ARDL) model demonstrated a negative and statistically insignificant association between green bonds and the Nigerian human development index, contrary to Joel and Efosa (2024). Increasing green bonds would reduce the human development index over time.

Contrary to Zakari's (2022) findings, the long-term connection between green loans and the human development index was negative and negligible, implying that an increase of one unit in green loans will lower the score.

Green investment exhibited a statistically negligible long-term negative connection with the human development index, consistent with Akerele, Okeme, and Amadi (2024). Each unit of green investment lowers the HDI.

Over time, the Human Development Index has a negative and negligible association with Nigerian green bonds, loans, and investments. Green finance indices negatively and insignificantly affect the country's economic sustainability, analysts found.

The reliability tests (LM correlation, heteroskedasticity, normality, stability, and functionality reset) show sustainable financial and economic growth in Nigeria.

Conclusion and Recommendations

The study examined impact of green financing on economic sustainability in Nigeria. from 1986 to 2023. This study employed green bonds, green loans, and green investments as explanatory factors and the human development index as a dependent variable for economic sustainability. The study employed Auto Regressive Lag modelling to explore long-term variable relationships. The study covered 1986 to 2023. Finally, environmentally friendly bonds, loans, and investments have a poor and negative long-term association with Nigeria's Human Development Index. Environmentally friendly financial measurements may have a tiny but unfavourable influence on the country's economy. Researchers suggested that the government cut loan interest rates, revitalise the green bond market to attract investors, and foster private company involvement to stimulate green investment.

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