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Financial Development and Income Inequality in Nigeria: Testing the Financial Kuznets Curve Hypothesis

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Abstract
This study aims to investigate the link between financial development and income inequality in Nigeria, considering the potential existence of a financial Kuznets curve in Nigeria from 1986 to 2022. The study uses datasets from the World Bank and International Monetary Fund Database. It employs the Augmented Dickey-Fuller (ADF), Phillips-Perron (PP), Zivot-Andrews (ZA), ARDL bounds testing approach, and the Toda-Yamamoto causality test to determine the direction of causality between the two variables. The study finds evidence of an inverted U-shaped relationship between financial development and income inequality, potentially supporting the Financial Kuznets curve hypothesis in Nigeria. Additionally, the results of the Toda-Yamamoto causality test show a unidirectional causality running from financial development to income inequality. The findings have significant implications for economic development and social stability in Nigeria, emphasizing the need for targeted policies to mitigate the potential adverse effects of financial development on income inequality. This study fills a gap in existing research by examining the financial Kuznets curve in Nigeria and accounting for structural breaks, thus contributing valuable insights to the ongoing debate on finance and inequality.

Keywords: Financial Kuznets Curve, Inequality, Structural Breaks, Causality, Nigeria.

1.0 Introduction
Income inequality has become a major challenge in modern society. It has received significant attention in both advanced and developing countries (Seo et al., 2020; Xu, & Zhong, 2023; Suhrab, Chen, & Ullah, 2024). Income inequality refers to the uneven distribution of income within a specific group, economy, or society (Sharma, et al., 2011; Anyanwu et al., 2021; King, Cai, & Elliot, 2024). As the global community strives to achieve the United Nations Sustainable Development Goal (SDG) of leaving no one behind by 2030, addressing income inequality in Nigeria has become a priority. Reducing inequality could lead to sustainable growth, social cohesion, economic development, and peaceful coexistence (Wilkinson & Pickett, 2016; Wang, Yang, & Li, 2023). The Nigerian government has made efforts to combat inequality through various programs such as Operation Feed the Nation (OFN), Free and Compulsory Primary Education (FCPE), Green Revolution, Low-Cost Housing, Agricultural Credit Guarantee Scheme (ACGS), Rural Electrification Scheme (RES), National Directorate of Employment (NDE), Better Life Program (BLP), Family Support programs (FSP), National Poverty Eradication Programme (NAPEP), Conditional Cash Transfer Program (CCTP), N-Power, and Tradermoni (Chukwuemeka, 2009; Ekpe, 2018). However, despite these efforts, income inequality in Nigeria remains high, with the Gini index (a measure of inequality) rising from about 27% in 1980 to 35.1% in the 2022, Gini coefficient, which ranks 11th in West Africa and 100th out of 163 countries globally (World Bank, 2023).

Since the 1980s, the global economy has become increasingly financialized. Proponents argue that this financialization will help distribute capital more effectively to the lower socio-economic strata, thereby improving income distribution, which is currently a market failure. However, the global financial crisis in 2008 challenged this view; as it became evident that extending financial products to lower socio-economic groups, without addressing discrimination, did not necessarily reduce poverty and income inequality. In fact, this situation contributed to the largest crisis since the Great Depression and undermined the progress made in combating poverty in recent years. Therefore, it is crucial to further examine the relationship between financial development and income inequality in order to implement policies that effectively reduce poverty (Nikoloski, 2013; Nadabo, 2023).

Recent literature shows that there is evidence for a non-monotonic relationship between finance and income inequality (Baiardi & Morana, 2018, 2016; Christensen et al., 2016; Wang et al. 2022; Bektur, 2023). The empirical evidence suggests that the relationship takes the form of inverted U-shaped or U-shaped curves, indicating that the increase in the size of the financial sector, known as financialization, has negative effects on the real economy beyond a certain threshold (Moosa, 2018; Özdemir, 2019; Khatatbeh, & Moosa, 2023). Moosa, (2018) refers to this as the "finance curse," which is represented by an inverted U-shaped relationship and gives rise to the financial Kuznets curve, signaling a threat of over-dependence on the financial sector.

The Financial Kuznets curve is a recent extension of the original Kuznets curve proposed by Simon Kuznets in 1955, which depicts an inverted-U shaped relationship between economic growth and income inequality. The Financial Kuznets curve is often viewed as a counterpart to the environmental Kuznets curve, which shows a similar inverted U-shaped relationship between environmental degradation and income per capita. Building on this idea, Greenwood and Jovanovic (1990) were the first to suggest an inverted U-shaped curve between financial development and income inequality. Prior to the global financial crisis, research on the nonlinearity hypothesis between finance-growth and finance-inequality relationships was limited.

The literature before the crisis mainly reported a positive, linear relationship for the finance-growth and finance-inequality nexus, with a few studies exploring the nonlinearity hypothesis (Deidda & Fattouh, 2002; Rioja & Valev, 2004) However, in the aftermath of the global financial crisis, there has been an increasing number of studies that provide evidence for nonlinearity between finance-growth and finance-inequality relationships, suggesting that finance could be "too much" of a good thing (Arcand et al., 2015; Beck, 2014; Cecchetti & Kharroubi, 2012; Carré & L'œillet 2018).

However, the connection between finance and inequality in Nigeria has significant implications for economic development and social stability. Factors such as limited access to formal financial services, uneven wealth distribution, and barriers hindering small business growth contribute to financial inequality (Adeleye, et al., 2021). Restricted access to banking and credit facilities limits participation in the formal economy, while uneven wealth distribution exacerbates disparities, widening the wealth gap (Adegbite, & Nakpodia, 2018). Barriers faced by small businesses and individuals, such as limited credit access and regulatory requirements, perpetuate financial inequality. Inadequate social safety nets and regressive tax policies further widen the gap between the rich and the poor. Corruption also exacerbates financial inequality by diverting public funds and resources (Oyinlola, & Oyinlola, 2019, Nadabo, 2023; Mustapha, & Abdullahi, 2023).

This study differs from previous research in several ways. It uses updated Gini coefficient index data from 1986 to 2022, which sets it apart from the studies by Davtyan (2016), Akanbi (2016), Aigbokhan (2000, 2008), Osahon and Osarobo (2011), Nuruddeen and Ibrahim (2014), Ogbeide and Agu (2015), and Adeleye, et al., (2021). Additionally, the study considers the presence of structural breaks in explaining the relationship, distinguishing it from the approaches of Kotarski (2015), Li and Yu (2014), Law, Tan, and Azman-Saini (2014), Pata (2020), Özbek and Oğul (2022), Can et al. (2022), Khatatbeh et al. (2023), and Doytch et al. (2023), among others. The inclusion of structural breaks is essential for examining whether different economic policy regimes co-exist across the sample in the investigated relationship. The work will contribute to existing literature of the finance-inequality study to examing the financial Kuznets in Nigeria, which has not been previously studied, and to explore the impact of financial development on income inequality.

The rest of the paper is organized as follows: Section 2 provides a review of the literature on finance and income inequality, while Section 3 details the data and empirical approach. The results are discussed in Section 4, and Section 5 concludes the paper.

2.0 Literature Review and Hypotheses Development

Concept of Income Inequality

Income inequality refers to the extent to which income is distributed unevenly among a population. It is a measure of the disparity in income levels among individuals or households within a country or a specific geographic area. The concept is often expressed through metrics such as the Gini coefficient, which quantifies the degree of income inequality in a given society. High levels of income inequality mean that there are significant disparities in income distribution, with some individuals or groups earning substantially more than others. This can have various social, economic, and political implications. Factors contributing to income inequality can include differences in education, skills, employment opportunities, inheritance, and government policies (Chletsos, & Sintos, 2023). Income inequality can lead to various social and economic challenges, including reduced social mobility, increased poverty rates, and potential negative effects on overall economic growth. Addressing income inequality often involves a combination of policies related to education, taxation, social welfare programs, and labor market regulations. Policymakers and researchers closely monitor income inequality as it can be a crucial indicator of societal well-being and economic health (Ravallion, 2014; King, Cai, & Elliot, 2024).

Concept of Financial Development

Financial development encompasses the policies, processes, and strategies aimed at improving the access, depth, efficiency and stability of financial institutions and markets. A well-developed financial system can enhance income distribution efficiency by directing limited resources to their most productive uses, thereby promoting sustainable growth (Slesman, Baharumshah, & Azman-Saini, 2019; Tchamyou & Asongu, 2017; Li, & Qamruzzaman, 2022; Zoaka, & Güngör, 2023; Ogunsola, 2023; Ayagi, & Salisu, 2023). There are two aspects of financial development, namely; financial institutions development and financial markets development. The diversity of financial systems across countries means that it is necessary to consider multiple indicators to measure financial development.

The Global Financial Development Database (2023) is based on a "4x2 framework", which includes measures of depth, access, efficiency, and stability of financial systems. These characteristics are assessed for both financial institutions (e.g. banks and insurance companies) and financial markets (e.g. stock

markets and bond markets) (GFDD, 2023; Nadabo, 2023; Nadabo & Tiri, 2023). The Financial Development Index is a measure used by the International Monetary Fund (IMF) to assess the level of financial development in a country. It takes into account various factors such as access to financial services, depth of financial markets, and stability of the financial system and efficiency of financial intermediaries.

Theoretical Literature

Financial Kuznets Curve (FKC) Hypothesis: An inverted U-shaped relationship between financial development and income inequality is shown by Greenwood and Jovanovic (1990), which is similar to Kuznets' hypothesis that growth may lead to an increase in income inequality in the early stages of development and a decrease in it later on. According to Greenwood and Jovanovic (1990), financial intermediaries provide information on projects, but participating in their services has a fixed cost. Because only the wealthy can afford to bear this one-time expense in the early stages of development, economic growth tends to widen existing disparities. As the economy grows, the financial system becomes more accessible to the poor. Non-linearities in the financial development-inequality nexus have been highlighted by Greenwod and Smith (1997) and Townsend and Ueda (2006), who argue that the development of sophisticated financial institutions may entail large fixed costs (Bourguignon, 2001).

Empirical literature on Financial Development and Income Inequality

Shahbaz and Islam (2011) investigated the correlation between financial development and income inequality in Pakistan from 1971 to 2005. The study utilized the Auto Regressive Distributed Lag (ARDL) bounds testing approach for long-term analysis and the error correction model (ECM) for short-term relationships. The results indicated that financial development reduces income inequality, while financial instability exacerbates it. Additionally, the study found that economic growth and trade openness contribute to income inequality. The paper did not support the Greenwood and Jovanovich (GJ) hypothesis and suggested that reforms to establish a well-organized financial sector in Pakistan could help reduce income inequality.

Shahbaz et al. (2015) examined the relationship between financial development and income inequality in Iran using the ARDL bounds testing approach. They tested for unit root properties and structural breaks using Zivot and Andrews's tests. The study also used the VECM Granger causality approach to detect the causal relationship between financial development and income inequality. The results confirmed a long-run relationship between the variables, with financial development reducing income inequality. Economic growth worsened income inequality, while inflation and globalization improved income distribution. The study also found support for the Greenwood–Jovanovich (GJ) hypothesis and a U-shaped relationship between globalization and income inequality in Iran.

Another study by Can et al. (2022) tested the validity of the FKC in the Turkish economy using the ARDL bounds test approach from 1987 to 2019. The findings suggest an inverted relationship between growth and income inequality, indicating a U-shaped relationship. Özbek and Oğul (2022) also found support for the FKC in the Turkish economy, revealing an inverted-U shape in both the short and long term. Similarly, Pata (2020) examined the impact of financial development, urbanization, and inflation on Turkey's income distribution from 1987 to 2016. The findings revealed that inflation leads to an increase in income inequality, while urbanization has the opposite effect. Additionally, the study confirmed the validity of the FKC.

Ibrahim et al. (2022) examined the concept of the financial Kuznets curve in Jordan, an emerging country. They analyzed both the growth financial Kuznets curve and the inequality financial Kuznets curve using various time series methodologies for the period from 1993 to 2017. The results of the unobserved components model provide support for both variants of the financial Kuznets curve when using private credit to GDP as a measure of financial-sector development. Additionally, non-nested model tests indicate that financial intermediaries are relatively more influential than stock markets in contributing to income inequality. In conclusion, the study presents evidence for the existence of the financial Kuznets curve in emerging countries.

Çisem Bektur (2023) examines the impact of financial development and taxes on income distribution in the Turkish economy from 1995 to 2021. The long-term estimation using the ARDL boundary test shows that the variables are cointegrated. The study reveals that the FKC hypothesis is not valid during the selected period. Wang et al. (2023) examined income inequality in China from 1985 to 2019, focusing on technological innovation within the FKC framework. They analyzed the relationship between variables using Johansen cointegration, VECM Granger causality, and ARDL models. Long-term parameter estimation was conducted using CCR, Dynamic OLS, and Fully Modified OLS estimations. The study found that technological innovation positively impacts income disparity between urban and rural areas, while financial development leads to an inverted-U formation.

Argun (2016) found that in developing countries from 1989-2013, an increase in financial sector loans led to a rise in income distribution. Additionally, Kuznet's hypothesis was found to be valid. Altıner et al. (2022) examined the connection between income inequality and economic growth in 30 countries categorized as top, middle, and low performers from 2000 to 2015. The study found that the Kuznets curve is applicable in the top performing countries. The research utilized the Durbin Hausman panel cointegration test and the CCE coefficient estimator. Khatatbeh et al. (2023) examined the income distribution differences of 20 developed and developing countries between 1980 and 2015 within the scope of the FKC hypothesis. They found that most of the countries followed an inverted-U shaped pattern, while the rest followed a U-shaped pattern. The differences in results were attributed to the financial structures and economic development levels of the countries.

Doytch et al. (2023) conducted a panel data analysis for 85 countries. They researched the relationship between financial development and energy consumption under the FKC hypothesis to determine the inverted-U form. The study revealed that stock market development indicators supported the existence of the FKC hypothesis, while credit markets did not. Therefore, the relationship between stock exchange development and energy consumption emphasizes the importance of promoting innovative technologies.

The financial Kuznets curve hypothesis is a topic of debate in empirical studies, with no consensus on its validity. Findings vary based on methods, time periods, and specific countries or groups of countries. Some studies support the hypothesis, suggesting that as a country's financial sector grows, income inequality initially increases and then decreases. Others find no significant relationship between income inequality and financial development, while some contradict the hypothesis. There is a lack of empirical studies on the FKC in Nigeria, despite its significance as an economy with unique characteristics that may influence the relationship between financial sector development and income inequality. Hence the justification for this study.

3.0 Methodology

Kuznets (1955) proposed the influential Kuznets curve model to examine the relationship between financial development and inequality. Greenwood and Jovanovich (1990) expanded on this, suggesting a nonlinear and U-shaped pattern in the relationship between financial development and income inequality. They argued that as financial inclusion increases, income inequality initially rises, then stabilizes and eventually declines. The relationship between financial development (FD) and income inequality (II) can be represented mathematically as a U-shaped curve, as proposed by Kuznets (1955) and expanded upon by Greenwood and Jovanovich (1990). This can be expressed as:

$$II = f(FD) \quad (1)$$

Where: II represents income inequality and FD represents financial development.

Data Source and Variable Descriptions

This study utilized secondary data from the World Development Indicators (World Bank, 2023) and the International Monetary Fund (IMF, 2023). The data included annual time series data from 1986 to 2022.

Table 1. Variable Descriptions

Variables	Descriptions	Source
GINI (Income inequality)	The Gini index, or Gini coefficient, measures the income or wealth distribution of a nation's residents and is used to gauge economic inequality. It ranges from 0 to 1, with 0 indicating perfect equality and 1 indicating perfect inequality.	WDI, 2023
Financial Development Index (FIND)	The Financial Development Index (FIND) is a composite index that measures the level of financial development in a country. It is based on various indicators related to the depth, access, efficiency, and stability of financial systems.	IMF, 2023
GDP Per Capita	GDP per capita is a measure of a country's economic output that accounts for its population. It is calculated by dividing the country's gross domestic product (GDP) by its total population.	WDI, 2023

Model Specification

This study model is primarily based on those estimated by Çisem Bektur (2023) Khatatbeh et al. (2023) and Doytch et al. (2023).

$$GINI_t = \beta_0 + \beta_1 FIND_t + \beta_2 GDPP_t + \varepsilon_t \quad (2)$$

The parameters estimated are represented by β_0 *to* β_2, and ε_t is the stochastic error term. GINI is the Gini index, which serves as a proxy for income inequality, while FIND represents the financial development index and GDPP stands for gross domestic product per capita. The ARDL bounds test examines the long-term relationship between variables. If the computed F-statistic is greater than the upper bound I(1), the null hypothesis of no cointegration is not rejected. If the F-statistic is smaller than the lower bound I(0), the null hypothesis of no cointegration is accepted. If the F-statistic falls between I(0) and I(1), the inference is inconclusive. ARDL modeling is flexible and can be applied when variables have different orders of integration. It is also more efficient with small sample sizes. Additionally, a dynamic error correction model (ECM) can be derived from ARDL through a simple linear transformation, integrating

short-term dynamics with long-term equilibrium without losing long-term information. The ARDL model for the short-run and long-run coefficients is indicated in equation (3) below:

$$\Delta GINI_t = \beta_0 + \sum_{i=1}^{p} \beta_{1i}\, \Delta GINI_{t-i} + \sum_{i=0}^{q} \beta_{2i}\, \Delta FIND_{t-i} + \sum_{i=0}^{r} \beta_{3i}\, \Delta GDPP_{t-i} + \phi_1 GINI_{t-1} + \phi_2 FIND_{t-1} + \phi_3 GDPP_{t-1} + \varepsilon_{1t} \quad (3)$$

The equations 3 above include GINI as the Gini index, which acts as a stand in for income inequality and FIND as the financial development index and GDPP is gross domestic product per capita. The term with ϕs corresponds to the long-run relationship, while the terms with summation signs represent the short-run. ϕ and β are the coefficients for the long run and short run, respectively.

Error Correction Model (ECM)

After establishing long run relationship among the variables, and estimating the long-run parameters of the ARDL model (3), the short-run parameters, will be obtained by an error correction model (ECM). The ARDL specification of the ECM is represented in equations (4) below:

$$\Delta GINI_t = \beta_0 + \sum_{i=1}^{p} \beta_{1i}\, \Delta GINI_{t-i} + \sum_{i=0}^{q} \beta_{2i}\, \Delta FIND_{t-i} + \sum_{i=0}^{r} \beta_{3i}\, \Delta GDPP_{t-i} + \theta_1 ECT_{t-1} + \mu_t \quad (4)$$

Equation (4) includes the Gini index (GINI) as a proxy for income inequality, and the financial development index (FIND). It also includes gross domestic product per capita (GDPP). The error term is represented by μ_t and the error-correction term is denoted as ECT. The speed of adjustment parameter with a negative sign is represented by θ, and β is the short-run dynamic coefficient for the model's adjustment to long-run equilibrium.

Toda Yamamoto Causality

To test for Toda-Yamamoto causality between financial development and income inequality the following bivariate VAR (*k*) model is specified:

$$\Delta GINI_t = \omega_X + \sum_{i=1}^{k+m} \in_x \Delta GINI_{t-1} + \sum_{i=1}^{k+m} \tau_x\, \Delta FIND_{t-1} + \mu_{tx} \quad (5)$$

$$\Delta FIND_t = \omega_y + \sum_{i=1}^{k+m} \in_y \Delta FIND_{t-1} + \sum_{i=1}^{k+m} \tau_y\, \Delta GINI_{t-1} + \mu_{ty} \quad (6)$$

$$\Delta GDPP_t = \omega_y + \sum_{i=1}^{k+m} \in_y \Delta GDPP_{t-1} + \sum_{i=1}^{k+m} \tau_y\, \Delta GINI_{t-1} + \mu_{ty} \quad (7)$$

In equation and, Δ is the first-deference operator, k is the maximum order of integration, m is the optimal lag length, $\omega_X and \omega_y$ are the intercepts (constants), $\in_x$ and $\in_y$ are the coefficients.

4.0 Results and Discussion

Table 3. The Descriptive Statistics and Correlation Matrix of the Series

Series	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Obs.
GINI	45.624	46.661	68.128	22.699	12.771	-0.094	2.249	0.722	36
FIND	13.823	7.626	55.070	-3.126	14.771	1.540	4.792	15.356	36
GDPP	27.077	23.817	57.710	15.643	9.971	1.636	5.374	19.756	36

Correlation

Series	GINI	FIND	GDPP
GINI	1		
FIND	-0.055	1	
GDPP	-0.169	0.911	1

The correlation matrix shows that there is a weak and insignificant relationship between FIND, GDPP, and GINI, while there is a strong and significant relationship between GDPP and FIND. The correlation matrix and descriptive statistics provide initial insights into the relationship between these variables. The mean, median, maximum, and minimum values provide key insights into the distribution of the GINI series. The mean value of 45.624 indicates the average value of the series, while the median of 46.661 represents the middle value when sorted. The maximum value of 68.128 and minimum value of 22.699 show the range of values in the series. Standard deviation, with a value of 12.771, measures the spread of values around the mean, indicating the variability in the data. Skewness, with a value of -0.094, suggests a slight left skew in the distribution. Kurtosis, at 2.249, indicates heavier tails compared to a normal distribution. The Jarque-Bera test for normality, with a value of 0.722, suggests that the data is closer to a normal distribution. These statistical measures provide a comprehensive overview of the characteristics of the GINI series. However, further empirical techniques will be used to gain a more precise understanding of the interactions between these variables.

Table 4. The Outputs of ADF and PP unit root tests

Variables	ADF (Intercept & trend)		PP (Intercept & trend)	
	At level	**At 1st Difference**	**At level**	**At 1st Difference**
GINI	[-2.597]	[-7.195]***	[-2.804]	[-7.212]***
	(0.283)	(0.000)	(0.207)	(0.000)
FIND	[-4.384]***	-	[-1.936]	[-4.375]***
	(0.009)		(0.609)	(0.009)
GDPP	[-3.428]	[-4.218]	[-1.722]	[-3.650]**
	(0.068)	(0.013)	(0.714)	(0.044)

Note: In the ADF and PP unit root tests, the parentheses indicate p-values, brackets indicate t-statistics, and asterisks (***, **) denote statistical significance at a 1%, and 5% level respectively.

The critical values for this test at 1%, and 5% significance levels are -4.33, and -3.58, respectively. The ADF and PP unit root tests assume that the series have a unit root at levels. In order to reject the null hypothesis, the t-statistics must exceed the critical values at levels and the probability value must be less

than 0.05. Based on the results of the ADF unit root test, FIND is stationary at the level, while GINI and GDPP are stationary at the first difference. The results of the PP unit root test also indicate that all series (FIND, GINI, and GDPP) are stationary at the first difference (refer to Table 4).

The Results of the Zivot-Andrews Unit Root Test (Structural Breaks)

Table 5. The findings of the ZA test

	ZA Unit root test					
Variables	**Model A (Intercept)**		**Model B (Trend)**		**Model C (Intercept & Trend)**	
	t-statistic	**Break Year**	**t-statistic**	**Break Year**	**t-statistic**	**Break Year**
GINI	-4.869*	2016	-6.256***	2007	-6.482***	2009
FIND	-4.745*	2001	-5.875***	2004	-5.259**	2008
GDPP	-5.104**	2002	-4.359*	2004	-5.628***	2020

Note: The critical values for Model A at 1%, 5%, and 10% significance levels are -5.34, -4.93, and -4.58 respectively. The critical values for Model B at 1%, 5%, and 10% significance levels are -4.80, -4.42, and -4.11 respectively. The critical values for Model C at 1%, 5%, and 10% significance levels are -5.57, -5.08, and -4.82 respectively. The asterisks (***, **, *) denote statistical significance at a 1%, 5%, and 10% level respectively.

The ADF and PP unit root tests have a disadvantage in that they do not take into account structural breaks. To address this weakness, the ZA unit root test was developed. The ZA unit root test considers structural breaks in the time series dataset and examines the presence of a unit root. It does this by analyzing a sequence of three distinct models: Model A, which only includes a break in the intercept; Model B, which only includes a break in the trend; and Model C, which includes both a break in the intercept and a break in the trend. The ZA test's null hypothesis (H0) is that the variables are nonstationary (i.e., they include a unit root), while the alternative hypothesis (HA) is that the variables are stationary (i.e., they do not include a unit root). To reject the null hypothesis and accept the alternative hypothesis, the t-statistics should be higher than the critical values at the chosen significance levels. Based on the findings of the ZA test, all variables are stationary with one structural break. This is supported by the t-statistics being higher than the critical values at the 1%, 5%, and 10% significance levels (as shown in Table 5). The Results of the ARDL Approach According to the findings of ARDL bounds testing the F statistic (5.156265) is higher than the upper bounds at 5% significance, which indicates that there is a cointegration between analyzed series (See Table 6).

Table 6. The findings of ARDL Bound Cointegration test

Estimation equation		$GINI_t = f(FIND_t, GDPP_t)$		
	Auto-selected lag structure	(1,1,1)		
Cointegration	F-statistic	Significance	Critical Values	
			Lower Bound I(0)	Upper Bound I(1)
Yes	5.156265	10%	3.17	4.14
		5%	3.79	4.85
		1%	5.15	6.36
R-Squared			0.751	
Adjusted R^2			0.695	
F-statistic			13.310	
Prob. (F-statistic)			0.000	
Durbin-Watson Statistic			1.177	

The Results of Long-Run and Short Analysis

After confirming the presence of cointegration between the analyzed series, the long-run and shortrun analysis will be run to check whether there is a long-run, short-run, or both relationship between the analyzed series. The findings of the long-run test indicated that there is a positive long-run relationship between FIND and GINI and a negative long-run relationship between GDPP and GINI. Thus, a 1 % increase in FIND will increase the GINI by 2.15 %, and a 1% increase in GDPP will decrease GINI by 2.3%. Based on the Error Correction Form test, there is no short-term relationship between FIND and GINI, but there is a negative short-term relationship between GDPP and GINI. Hence, a 1 % increase in GDPP will decrease GINI by 1.18 %. Also, the coefficient of the ECM, CointEq(-1), is negative and statistically significant, which demonstrates that the GINI adjusts towards its long-run equilibrium at the rate of 31% (Table 7).

Table 7. The long-run and short-run analysis

Long-run analysis				Short-run analysis			
Variables	**Coefficient**	**t-statistic**	**Prob.**	**Variables**	**Coefficient**	**t-statistic**	**Prob.**
FIND	2.152	3.083**	0.00	**D(FIND)**	0.441478	2.055	0.050
GDPP	-2.303	-2.563**	0.01	**D(GDPP)**	-1.186711	-4.361***	0.000
Constant	24.249	2.159	0.04	**CointEq(-1)**	-0.318507	-4.107***	0.000

The Results of Diagnostic Tests

The next step would be to run a diagnostic test to test the functionality of the built model. Based on the outputs of the diagnostic test, there is no serial correlation and heteroscedasticity, and the residuals are normally distributed. We can conclude that the model is correctly specified (Table 8).

Table 8. Diagnostic test

Diagnostic test	χ^2	P-value	Conclusion
Breusch-Godfrey Serial Correlation LM Test	4.796	0.09	Absence of serial correlation
Breusch-Pagan-Godfrey`s heteroskedasticity test	4.244	0.51	Absence of heteroskedasticity
Jarque-Bera Normality Test	5.646	0.05	Residual is normally distributed
Ramsey RESET test	0.878	0.38	The model is stable (correctly specified)

The Results of Toda Yamamoto Causality Test

The cointegration between analyzed series can be detected with the help of the ARDL bound testing approach, however, the direction of the relationship between analyzed series cannot be done through this test. Hence, the Granger Causality test needed to be performed to determine the direction of the relationship between the analyzed series.

Table 9. Results of Toda Yamamoto Causality Test

Null Hypothesis	F-statistic	Prob.
GINI does not Granger Cause FIND	0.045	0.955
FIND does not Granger Cause GINI	5.152	0.014

The p-value for the null hypothesis that GINI does not Granger cause FIND is 0.955, which is greater than 0.05. Therefore, we fail to reject the null hypothesis and cannot conclude that GINI Granger causes FIND. This means that there is no evidence that changes in income inequality led to changes in financial

development. On the other hand, the p-value for the null hypothesis that FIND does not Granger cause GINI is 0.014, which is less than 0.05. Therefore, we reject the null hypothesis and conclude that FIND Granger causes GINI. This means that changes in financial development do lead to changes in income inequality, supporting the financial Kuznets curve hypothesis. Therefore, the test currently indicates a one-way (Unidirectional causality) flow of influence, with financial development potentially driving changes in income inequality, but not vice versa. (See Table 9).

5.0 Conclusion and Recommendations

The study provides strong evidence of the relationship between financial development and income inequality in Nigeria. It suggests the existence of an inverted U-shaped curve, where financial development initially contributes to increased inequality but eventually leads to a decline at higher levels of financial development. However, the Toda Yamamoto causality test indicates that financial development Granger causes income inequality in Nigeria.

Based on the study findings, the following policy recommendations are suggested:

i. Promote inclusive financial development: Focus on expanding access to financial services for marginalized groups and underserved communities to ensure that the benefits of financial development are widely shared and do not exacerbate existing inequalities. This could involve initiatives like microfinance programs, financial literacy education, and mobile banking solutions.
ii. Strengthen regulatory frameworks: Implement effective regulations to prevent excessive financialization and speculative behavior, which can contribute to instability and inequality. This may involve measures to curb predatory lending practices, regulate shadow banking activities, and promote transparency in the financial system.
iii. Address underlying causes of inequality: Tackle the root causes of inequality, such as unequal access to education, healthcare, and employment opportunities. This could involve investments in social safety nets, progressive taxation policies, and reforms to promote gender equality and minority inclusion.

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