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Exploring Financial Inclusion Enhancement as a Correlate to Per Capita Income: Investigating the Impact on Nigeria's Economic Performance

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Abstract

The persistent issue of financial inclusion (FI) among unbanked Nigerians has been a major concern in Nigeria and other developing nations worldwide. This menace has contributed to poverty levels and low per capita income (PCI), which have affected the livelihoods of Nigerian citizens. This serves as a motivation that makes the study contribute uniquely by exploring financial inclusion enhancement as a correlate to per capita income as well as investigating the impact of FI and income per capita on Nigeria's economic performance. The secondary data utilized for this study covers 1993 to 2023 and was extracted from the World Bank development indicator. We performed the unit root test to establish the stationarity of the series, and the VAR model reveals a short-run relationship between economic performance, FI, and PCI, while controlling for population growth. The FMOLS shows that FI and PCI have a positive long-run significant effect on economic performance, while population growth has a negative significant influence on economic performance in the long run. Therefore, the government should prioritize the implementation of both short-term and long-term sustainable solutions. These solutions should uphold the mandatory policies for financial inclusion, which will integrate the unbanked into the financial system, improve per capita income, and mitigate the poverty rate caused by population growth.

Keywords: Economic Performance, FI, FMOLS, PCI, Unit Root Test, VAR Model.

Introduction

Financial inclusion (FI) pertains to economic development by ensuring the population's access to financial services, hence aiding poverty alleviation and enhancing per capita income in Nigeria and other developing nations (1). FI basically begins with adults having a transaction account that enables saving, sending, and receiving payments (2). Low-income individuals and households face inconveniences and high transaction costs in maintaining formal bank accounts (3-5), but the emergence of mobile telephony has mitigated these issues, especially in rural areas (1, 6). Additionally, the widespread availability of mobile phones and internet connectivity has had a substantial impact on our professional pursuits, lifestyles, and communication methods. Mobile financial services are revolutionary in emerging nations, as they seek to integrate the underserved and financially excluded into the formal financial system, in addition to conventional banking services (6-8). By bridging the financial infrastructure divide, the provision of banking services via mobile devices has significantly enhanced FI (9, 10). The pivotal role of mobile technology, a cost-effective transactional platform, a supportive regulatory framework, and carefully crafted financial products and revenue models in enabling developing nations to integrate the unbanked into the formal financial system is exemplified by M-Pesa, the world's leading mobile phone-based financial service (11, 12). In nearly 20 unstable

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states that provide mobile money services, each commercial bank branch employs an average of approximately 47 mobile money agents, thereby establishing a new category of payment services and a unique method of accessing financial services (13). Inclusive finance promotes sustainable economic development and effective wealth creation, prioritizing financial inclusion in eight of the seventeen Sustainable Development Goals (SDGs) set forward by the United Nations (UN) (14-19). Leveraging digital financial services, and economic inclusion can contribute to reducing community-based transmission in Africa, advancing health and well-being for all as outlined in SDG 3 during the COVID-19 pandemic. Digital finance limits traditional branch-based banking by offering safe, fairly priced, frictionless financial instruments across ecosystems, therefore reducing the physical cash flow. Both empirical data and theory agree that FI is necessary for the advancement of the economy. Giving under-represented groups more reasonably priced financial services—including credit, savings, and payment options—could improve company prospects, raise investments, and considerably boost economic development (20, 21). Financial inclusiveness can serve to protect savings, minimize the financial risks experienced by under banked and unbanked persons, and promote consumption stability (22-25). Thus, financial inclusion lowers income inequality, advances general economic development, and helps to lower poverty (26). Nevertheless, numerous studies have conducted a comprehensive analysis of the link between economic expansion and FI, and they have identified a positive correlation (8, 9, 15, 16, 27-31). An additional investigation studied the effect of FI on economic expansion in 37 African countries from 2004 to 2012 (15). The dynamic GMM estimator of the panel was employed to establish a positive correlation between the number of commercial bank branches and real GDP per capita in the study. Additionally, financial deepening has significantly and positively influenced the economic development of sub-Saharan Africa. From 2007 to 2015, a study examined the correlation between FI and economic expansion in eight South Asian countries (31). The application of GMM estimators revealed that increased income was directly correlated with enhanced financial accessibility. Additionally, the economic development of low-income countries is more significantly influenced by improvements in financial access indices than that of middle-income countries. Numerous studies were conducted to examine the correlation between economic expansion and FI in 55 Organization of Islamic Cooperation (OIC) countries. These studies applied dynamic panel estimates and other appropriate econometrics model (8). The results of dynamic panel estimations indicate that economic growth is stimulated by financial inclusion. From 2007 to 2016, an additional investigation investigated the correlation between economic performance and FI in 11 distinct nations (32). They implemented a vector error correction model, an aggregated regression model, and Granger causality tests. The results indicated a consistent connection between FI and economic expansion. The empirical study produced conflicting results about the effect of FI on economic expansion. Studies demonstrate a positive link between FI and economic performance in multiple countries (17, 33-35). Inclusive finance promotes favorable wealth generation and enduring economic development over time (14). This study is based on the finance-growth theory, which asserts that financial development promotes a dynamic and productive environment that facilitates growth. This hypothesis identifies limited access to finance as a significant contributor to enduring economic inequality and stagnant growth. Consequently, we recognize access to a secure, convenient, and affordable financial source as a prerequisite for accelerating growth, reducing income inequality and poverty, fostering equal opportunities, facilitating the integration of economically and socially marginalized individuals into the economy, enabling their active contribution to development, and providing protection against economic shocks (36). Therefore, the objective of this study is to make a unique contribution to the scholarly body of knowledge by exploring FI enhancement as a correlate to per capita income as well as investigating the impact of FI and income per capita on Nigeria's economic performance.

Methodology

This study employed a quantitative research design to explore the impact of FI and income per capita on Nigeria's economic performance by utilizing secondary dataset which was extracted from the World Bank development indicator

spanning from the 1993 to 2023 and the selected period was based on data availability and to also avoid missing values using purposive sampling techniques. The quantitative methods we applied in this study includes the descriptive statistics (for summarizing the dataset), unit root test, ordinary least square (OLS) regression, fully modified ordinary least square (FMOLS), vector auto regression (VAR) model and correlation matrix that helps to evaluate the direction and strength of association between variables. Besides, we applied the unit root test to ensure the determination of the stationary of the series by eliminating the existence of the unit root that can result to misleading findings from the series. The OLS regression helps to establish linear link between two variables and also reveals the impact of the predictor variables on the outcome variable. Meanwhile, the FMOLS were employed to investigate the long-term impact of the independent variables on the dependent. The VAR model was also applied to determine the short-run link between the outcome variable and predictor variables. The cointegration test was also conducted but the results show that there is no cointegration; hence we cannot explore the vector error correction (VEC) model. However, the underlying OLS model can be written out in mathematical form as follows (14):

$$Y = X\beta + \varepsilon \quad [1]$$

Where:

Y is the outcome variable vector,

X is the matrix of the explanatory variables,

β is the vector of the coefficient estimates,

ε is the vector of residuals.

The OLS estimator of β can be written as:

$$\hat{\beta} = (X'X)^{-1}X'Y \quad [2]$$

The FMOLS estimator can be written as:

$$\hat{\beta} = (X'X)^{-1}X'(Y + \Delta) \quad [3]$$

Where Δ illustrates the adjustments for serial correlation in time series data. The functional link between the variables of interest can be illustrated as follows:

$$GDP = f(FI, PCI, Pop - growth) \quad [4]$$

The OLS regression model specification will take this form (8, 9):

$$GDP_t = \beta_0 + \beta_1(FI)_t + \beta_2(PCI)_t + \beta_3(Pop - growth)_t + \varepsilon_t \quad [5]$$

Where $\varepsilon_t \sim N(0, \sigma^2)$

The Gross Domestic Product (GDP) is the dependent variable and it's a proxy to the Nigeria's economic performance. FI and per capita income (PCI) are the main independent variables while the control variable is the population growth (Pop-growth). The intercept or constant term is β_0, the coefficient estimates of the predictor variables are denoted by β_1 through β_3, and the error term or residual is denoted by ε_t , while t is the period in years.

Diagnostic Tests

This study carried out diagnostic tests such as the serial correlation test, heteroscedasticity test, normality test of model residuals, multicollinearity test using the variance inflation factor (VIF) and CUSUM test of the model parameter stability to validate the fitted OLS regression model while another normality test was also conducted to validate the fitted FMOLS and VAR Model. Table 1 is the variable's description that comprises of the variables, variable definition and the measurement of the variables. The variables conceptual framework is well illustrated in Figure 1.

Table 1: Variable's Description

Variables	Definition	Measurement
GDP	This is the total monetary value of goods and services in a country over a period of one year	Billion USD
Financial Inclusion	This is the process of making the unbanked population to have access to the financial service	Percentage of GDP (%)
Per Capita Income	It implies the country total national income divided by the population of the country. It also helps to measure the livelihood of individual in a country	US Dollar (USD)
Population Growth	This refers to the rate of increase in population over a period of time	Percentage (%)

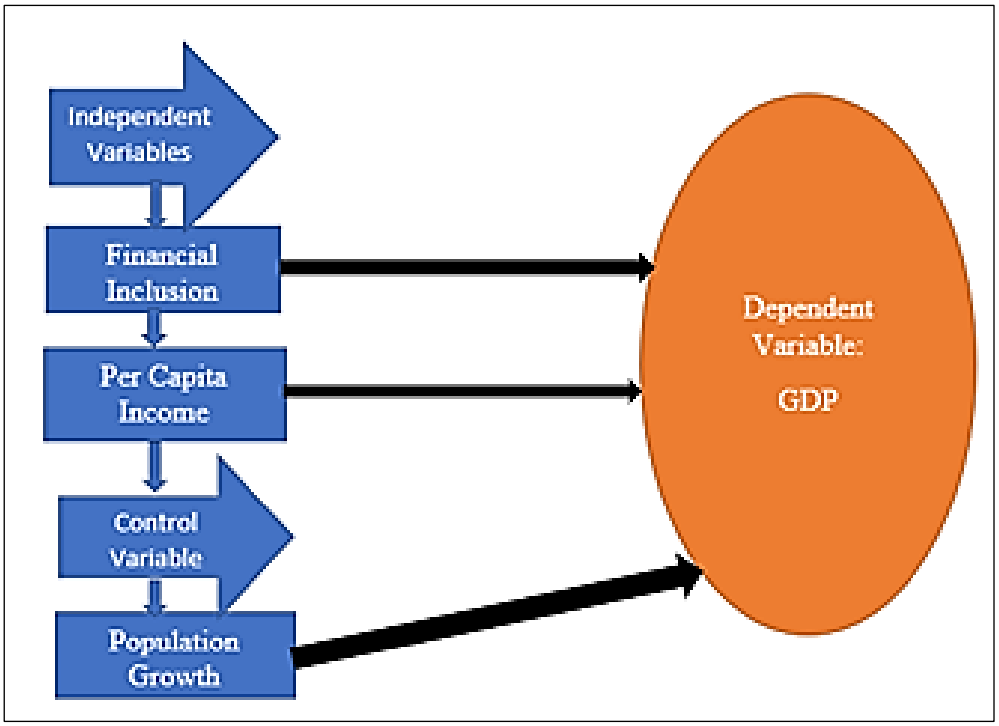

Figure 1: Conceptual Framework

Results

Table 2: Descriptive Statistics

	GDP	FI	PCI	Population Growth
Mean	289.201	10.852	1849.129	2.627
Maximum	574.184	19.626	2970.000	2.800
Minimum	56.721	6.174	841.000	2.410
Std. Dev.	162.071	3.344	560.620	0.118
Skewness	-0.024	0.772	-0.078	-0.241
Kurtosis	1.614	3.257	2.429	1.897
Jarque-Bera	2.483	3.166	0.453	1.871
Probability	0.289	0.205	0.797	0.392
Observations	31	31	31	31

Table 3: Unit Root Test

Differenced Series	Test-Statistic	P-value	Order Level
GDP	-4.08	0.0037	Order 1
FI	-4.87	0.0006	Order 1
PCI	-5.37	0.0001	Order 1
Population Growth	-4.15	0.0040	Order 1

Table 2 shows that the average GDP is about 289 billion USD, the average financial inclusion is about 11% of GDP, the average per capita income is about 1849 USD, and the average population growth is about 2.6% during the period under review, which is from 1993 to 2023. The dataset's kurtosis approaches zero, and its probability value surpasses the 0.05 significant levels, confirming its normal distribution.

Table 3 shows that the series such as the GDP, FI, PCI, and population growth are statistically significant and become stationary. After the first difference, implying that the unit root that can cause misleading results has been eliminated and therefore further econometrics analysis can be carried out with the series.

Table 4: OLS Regression

GDP	Coefficient	T-Statistic	P-value	VIF
FI	4.079	0.82	0.0190	1.72
PCI	0.242	8.18	0.0000	1.73
Population Growth	-393.749	-3.65	0.0010	1.01
Constant	830.160	2.93	0.0070	NA
Overall Model P-value	0.0000			
R-squared	0.835			
Adj R-squared	0.8168			
Serial Correlation Test				
Durbin–Watson = 1.6128				
Homoscedasticity Test				
P-value = 0.5116				
Normality Test				
P-value = 0.3764				

Table 4 shows that the overall model probability value of 0.000 is less than 0.05 significant level, which implies that the OLS regression is statistically significant, indicating that there is a significant linear relationship between the economic performance, financial inclusion, and per capita income while controlling for the population growth in Nigeria. The R-squared value of 0.835 indicates that 83.5% variation in Nigeria's economic performance can be attributed to financial inclusion, per capita income, and population growth. The R-squared is relatively high and the model is statistically significant, which indicates that the fitted OLS regression is a good fit for the dataset and is appropriate for the future prediction of Nigeria's economic performance. Additionally, the coefficient estimates of financial inclusion and per capita income have a positive significant impact on the Nigerian economic performance at the 5% level, indicating that increases in financial inclusion and per capita income contribute to the increase in Nigeria's economic performance. However, the coefficient estimate of the population growth has a significant negative effect on Nigeria's economic performance, indicating that increases in the population growth contribute to the decline in Nigeria's economic performance. Besides, the VIF of the explanatory variables is less than 5, suggesting that the fitted OLS regression doesn't manifest the problem of multicollinearity. The serial correlation test shows that the probability value exceeds the 0.05 significant level, indicating that the OLS regression does cause the problem of autocorrelation. The heteroscedasticity test also shows that the probability value exceeds the 0.05 significant level, indicating that the model does manifest the problem of heteroscedasticity, and the normality test of the fitted OLS regression model residuals reveals that the probability value of 0.3764 exceeds the 0.05 significant level, suggesting that the model residuals are normally distributed, satisfying the normality assumptions.

Table 5: VAR Model

Equation	Lag Parameters	R-squared	P-value
GDP	9	0.9040	0.0000
FI	9	0.8102	0.0000
PCI	9	0.9686	0.0000
Population Growth	9	0.9712	0.0000
Normality Test			
P-value = 0.1988			

Table 5 treats the series such as GDP, FI, PCI, and population growth as endogenous with nine estimated lag parameters. This treatment reveals that each series and the estimated parameters have corresponding probability values less than the 0.05 significant level, suggesting a short-run significant relationship between Nigeria's economic performance, financial inclusion, and per capita income, while accounting for Nigeria's population growth. Each of the estimated

endogenous equations has a relatively high R-squared, and the normality test of the model residuals, with a p-value of 0.1988, surpasses the 0.05 significant level, confirming the normal distribution of the fitted VAR model residuals and validating the model fitting.

Table 6 demonstrates that the coefficient estimates of financial inclusion and per capita income have a long-term positive significant impact on Nigeria's economic performance, suggesting that increases in these factors contribute to an increase in the country's economic performance. Conversely, the coefficient estimate of population growth has a long-term negative significant influence on Nigeria's economic performance, suggesting that increases in population growth contribute to a long-term decline in the country's economic performance. The FMOLS normality test reveals that the probability value of 0.4594 surpasses the 0.05 significant level, confirming the normal distribution of the model residuals. The FMOLS R-squared of approximately 81.3% is relatively high, confirming the adequacy of the model.

Table 6: FMOLS

GDP	Coefficient	T-Statistic	P-value
FI	9.215	1.36	0.0187
PCI	0.214	5.07	0.0000
Population growth	-397.635	-2.69	0.0123
Constant	831.981	2.14	0.0420
R-squared	0.813		
Adj R-squared	0.791		
Normality test			
P-value = 0.4594			

Table 7: Correlation Matrix

	GDP	FI	PCI	Population Growth
GDP	1			
FI	0.6073	1		
PCI	0.8660	0.6469	1	
Population Growth	-0.1957	0.0718	0.1010	1

Table 7 demonstrates a moderately positive correlation between financial inclusion and per capita income (r = 0.6469), suggesting that improved financial inclusion will elevate the per capita income of individuals in Nigeria. Table 7 demonstrates a moderately positive correlation between economic performance and financial inclusion while indicating a strong negative relationship between economic performance and per capita income. This suggests that higher financial inclusion and per capita income correlate with improved economic performance in Nigeria. Additionally, the results indicate a weak negative correlation between Nigeria's economic performance and population growth, implying that an increase in population growth may lead to a decline in economic performance. Figure 2 illustrates that the CUSUM test of the estimated OLS regression model parameters indicates that the parameters reside within the two 95% confidence intervals, implying the stability of the fitted OLS model parameters. Figure 3 illustrates the economic performance graph from 1993 to 2023, revealing a rising trajectory with a severe decrease in 2020 and again in 2023 due to the economic crisis. Figure 4 illustrates the graph of financial inclusion, exhibiting an erratic trend pattern during the review period, which aligns with the prevailing scenario, as financial inclusion in Nigeria remains unstable. Figure 5 illustrates the graph of per capita income, exhibiting a rising trend that drastically declines in 2023 due to the ongoing economic crisis in Nigeria.

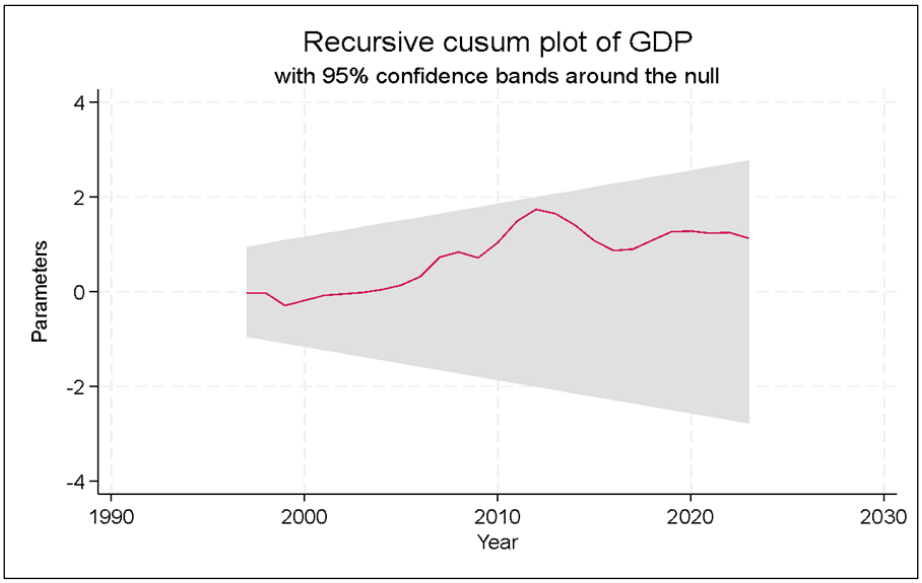

Figure 2: CUSUM Test of the Fitted OLS Model Parameters

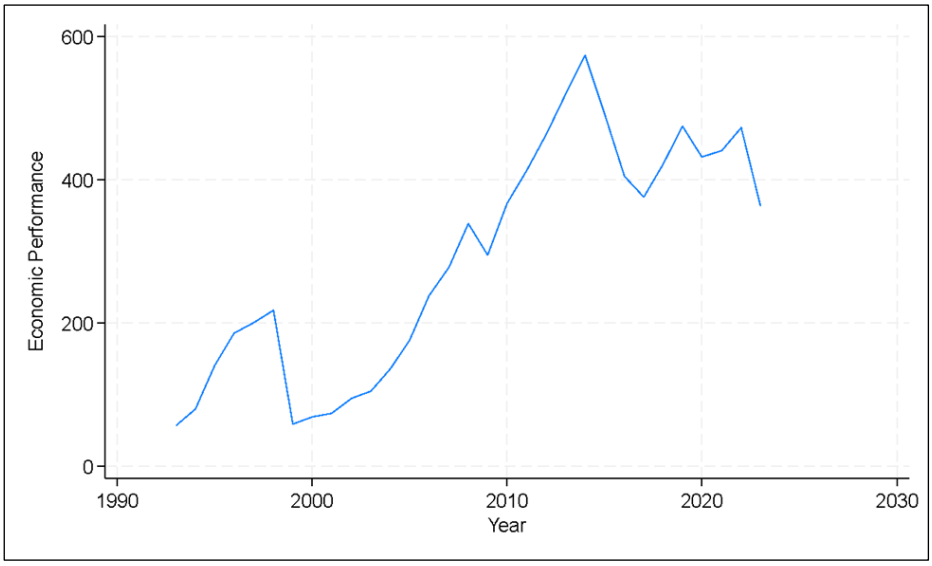

Figure 3: The Graph of the Economic Performance over a Period of 1993 to 2023

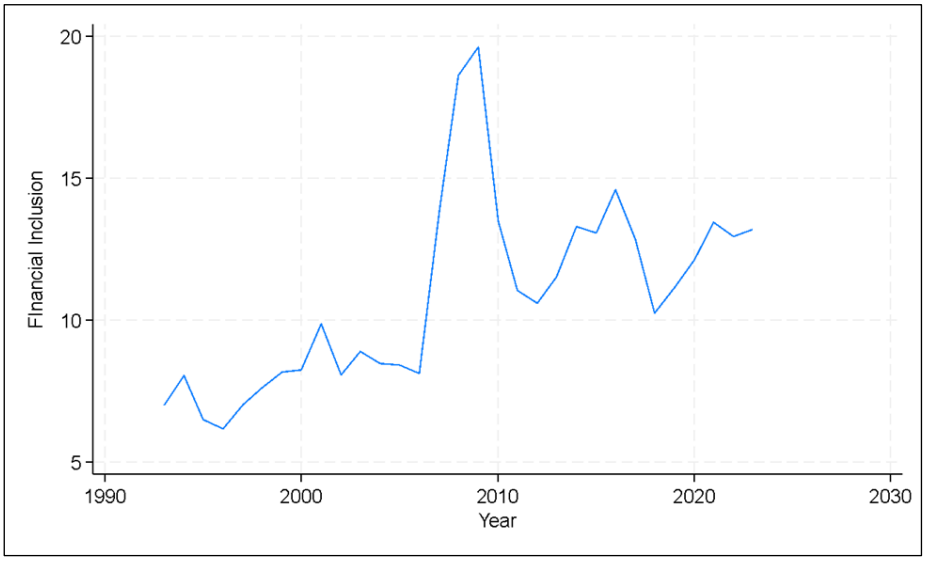

Figure 4: The Graph of the Financial Inclusion over a Period of 1993 to 2023

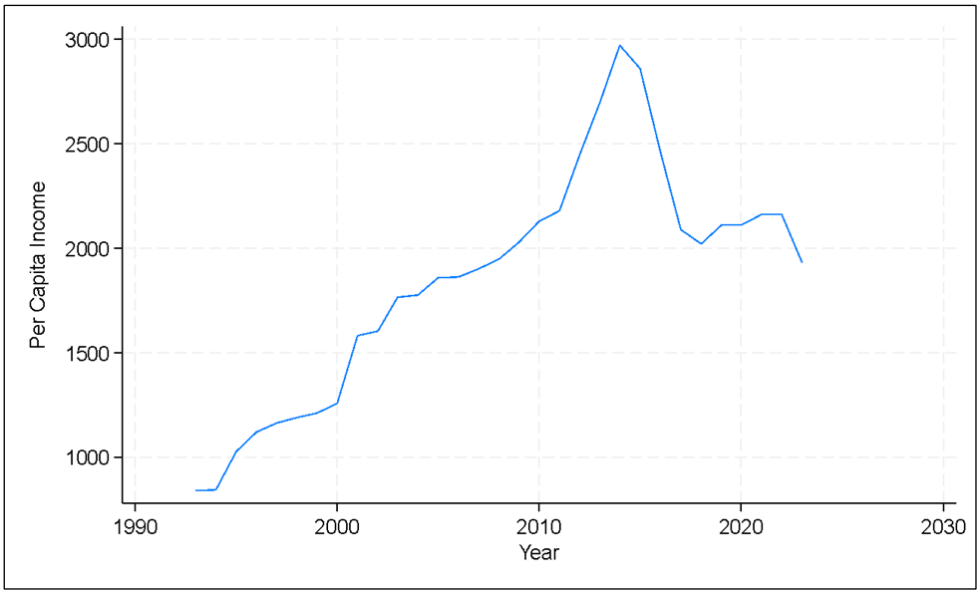

Figure 5: The Graph of the Per Capita Income over a Period of 1993 to 2023

Discussion

The study analysed the effects of financial inclusion and per capita income on Nigeria's economic performance, while accounting for population increase. The analysis results indicate that financial inclusion and per capita income significantly positively impact Nigeria's economic performance at a 5% level, suggesting that increases in financial inclusion and per capita income enhance Nigeria's economic performance. The coefficient estimate for population growth demonstrates a significant negative impact on Nigeria's economic performance, suggesting that an increase in population growth contributes to a decline in economic performance, consistent with existing literature (8, 9, 15, 31, 32). This also aligns with the finance-growth theory, which posits that financial development fosters a dynamic and productive environment conducive to growth. Table 5 reveals a significant short-run association between Nigeria's economic success, financial inclusion, and per capita income, while accounting for the country's population growth. Table 6 indicates that the coefficient estimates for financial inclusion and per capita income exert a long-term positive significant impact on Nigeria's economic performance, suggesting that increases in these factors enhance Nigeria's economic performance over time. Conversely, the coefficient estimate for population growth demonstrates a long-term negative significant influence on Nigeria's economic performance, implying that rising population growth contributes to a decline in economic performance in the long run. Furthermore, Table 7 illustrates a moderate positive correlation between financial inclusion and per capita income, suggesting that improved financial inclusion will elevate the per capita income of individual citizens in Nigeria.

Conclusion

The financial inclusion of unbanked Nigerians has been a persistent concern in Nigeria and other developing countries for many years. This epidemic has exacerbated poverty levels and diminished per capita income, adversely impacting the livelihoods of Nigerian inhabitants. This study aims to uniquely contribute by examining the enhancement of financial inclusion as it relates to per capita income, as well as assessing the effects of financial inclusion and per capita income on Nigeria's economic performance. The results demonstrate a short-term association among Nigeria's economic success, financial inclusion, and per capita income, while accounting for population increase. The study's findings reveal that financial inclusion and per capita income exert a long-term positive significant impact on Nigeria's economic performance, suggesting that increases in these factors enhance the country's economic performance over time. Conversely, population growth has a long-term negative significant effect on Nigeria's economic performance, indicating that rising population growth contributes to a decline in economic performance in the long run. The study indicates a moderate positive link between financial inclusion and per capita income,

suggesting that improved financial inclusion will elevate the per capita income of individuals in Nigeria. Consequently, the government should prioritise the implementation of both short-term and long-term sustainable solutions that will uphold mandatory financial inclusion policies, integrate the unbanked into the financial system, enhance per capita income, and alleviate poverty resulting from significant population growth. Meanwhile, future studies should focus on integrating financial inclusion with sustainable finance in developing nations at large to enhance economic growth and development.

Abbreviations

GDP: Gross domestic product, FI: Financial inclusion, PCI: Per Capita Income, Pop-growth: Population growth.

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Author Contributions

We all contributed in all spheres of the study sections to produce this quality work.

Conflict of Interest

The authors does not have any conflict of interest.

Ethics Approval

The data used for this study is collected from an open reliable source and no ethical approval is required.

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