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Financial inclusion, income inequality and financial dollarization in Nigeria: An empirical analysis

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Abstract
This study examines the impact of financial inclusion and financial dollarization on income inequality in Nigeria. Newey-West estimation technique was used to address the problem of heteroscedasticity and autocorrelation in the time series data. Three key financial inclusion indicators were used (number of bank accounts, number of bank branches per capita and number of ATMs), and a financial dollarization variable measured as a foreign currency deposits as a percentage of total deposits. The results shows that increase in financial inclusion through the expansion of bank accounts and branches statistically reduces income disparity. This effect is evident under dollarized financial environment where the interaction between financial inclusion and financial dollarization amplifies the inequality reducing impact. Conversely, financial dollarization on its own worsen income inequality, signifying the dual role of financial inclusion as both a preventer and enhancer of income disparity in a dollarizing economy. Furthermore, the study finds that higher inflation rate and interest rate also aggravate income inequality. Whereas, government spending shows a complex relationship, with slight increases in inequality observed at the margin. The findings underscore the importance of targeted financial and economic policies that enhance financial inclusion to mitigate the adverse effects of dollarization and promote more equitable income distribution. The study's methodology ensures robust and reliable estimates, providing valuable insights for policymakers in emerging economies coping with income inequality and financial instability.

Keyword: Financial inclusion, financial dollarization, income inequality

1. Introduction

Income inequality is a significant socio-economic issue in Nigeria. The gap between the wealthy and the poor remains substantial despite various government and economic reforms. Recent statistics shows Nigeria's Gini index around 35.1, ranking it moderately in the global context but still demonstrating considerable inequality, particularly among low-income populations and rural communities (WDI, 2022).

Inequality is driven by several factors such as limited access to financial services, economic volatility, and wealth concentration, especially in resource-rich sectors. However, one major contributor to Nigeria's inequality is the uneven access to financial services. Data from Nigeria based on Enhancing Financial Innovation and Access (EFInA) survey shows that as at 2023 [27], about 36% of Nigerians still lack access to formal financial services, especially in rural and low-income areas, (Central Bank of Nigeria (CBN), 2020; EFInA, 2020 and EFInA, 2023) [13, 26]. Financial inclusion can be a key driver in reducing income inequality, as it empowers individuals and small businesses with tools for saving, investing, and managing financial risks. However, the potential benefits of financial inclusion in Nigeria are often offset by the high level of financial dollarization.

Nigeria's dollarization stems largely from economic instability, currency depreciation, and reliance on oil exports, which are priced in dollars. The depreciation of the naira averaging approximately 1462.74 NGN/USD in 2024 (Financial Times, 2024) has increased costs for the average Nigerian, impacting essential goods and services disproportionately and further straining income distribution. Studies from other resource-rich countries reveal that when financial inclusion is pursued in dollarized economies, its effects on inequality can be complex typical example is the case of Angola and Venezuela (IMF, 2015).

Financial inclusion, as articulated by World Bank refers to situation where individuals

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and businesses get access to useful and affordable financial services and products. In essence, financial inclusion is the process of offering affordable, convenient, and timely financial services to all members of society, especially those who are economically vulnerable. The manifold benefits derived from promoting financial inclusion span economic growth, poverty eradication, and a reduction in income inequality (Demirgüç-Kunt, Klapper & Panos, 2016) [20].

Despite its pivotal role in addressing socio-economic challenges, empirical works on financial inclusion remain limited. The existing literature lacks comprehensive information due to the scarcity of comparable data on global access and usage of financial services. However, the release of the Global Financial Inclusion database by the World Bank has alleviated this data constraint.

This study contributes to the literature on financial inclusion by examining its impacts, and those of its components, on income inequality, specifically looking at how the contribution of financial inclusion on income inequality reduction may change in the presence of financial dollarization. To achieve this objective, we used three measures of financial inclusion, indicators of financial dollarization and Gini index. The study is organized in five sections. Section one provides the background to study. While section two presents the theoretical and empirical literature. Section three is the methodology. Chapter four analyses the data and presents the result based on the findings and section five concludes and draws policy implication.

2. Literature Review
2.1 Theoretical Literature
Two theories are relevant to this study and applying these theories can explain the relationship between financial inclusion, financial dollarization and income inequality in Nigeria. In determining these chosen theories, we consider the specific research questions, objectives, and the unique socio-economic context of the country. Combining insights from these theories offer a more comprehensive understanding of the relationship between financial inclusion financial dollarization and income inequality in the Nigerian context (Okowa & Owede, 2022) [46]. These theories are financial intermediation theory and institutional theory.

The financial intermediation theory directly addresses the core relationship between financial services and economic activities, which is crucial in understanding how financial inclusion may influence income distribution (Levine, 2005). The relevance of this theory lies in the fact that it directly addresses the impact of financial services and credit on economic activities and income distribution (Allen & Santomero, 1997) [5]. The theory further suggests that financial institutions play a crucial role in bridging the gap between savers and borrowers (Diamond, 1984) [23]. As individuals gain access to banking services and credit through financial inclusion, they can invest in income-generating activities, potentially enhancing their income, smoothening their consumption and thereby reducing income inequality (Beck, Demirgüç-Kunt, & Levine, 2007) [8].

The Institutional Theory on the other hand, focuses on the role of formal institutions particularly laws, regulations, and policies, and informal norms in shaping economic and financial outcomes. According to this theory, strong institutions provide the foundation for financial systems to function effectively and inclusively (North, 1990; Acemoglu & Robinson, 2012) [2, 43]. Under this framework, financial inclusion will heavily be influenced by institutional quality, such as regulatory frameworks, property rights, and enforcement of financial contracts. This is because strong institutions will foster trust in financial systems, encouraging individuals to use formal financial services (e.g., savings accounts, credit facilities). This promotes financial inclusion, particularly for marginalized groups, and reduces income inequality.

Conversely, weak institutions such as poor regulatory oversight and corruption result in exclusion, as it makes financial services become inaccessible or unaffordable for low-income individuals, thereby widening inequality. Furthermore, economies with weak institutions that allows for high inflation, unstable local currency often makes financial dollarization to thieve. This is because individuals and businesses seek refuge in foreign currencies to in order to protect their wealth. This in turn, worsen income inequality, because wealthier individuals with better access to foreign currency and foreign-denominated financial instruments benefit disproportionately, while low-income individuals remain excluded.

In summary, Financial Intermediation Theory explains the channels through which financial inclusion reduces inequality, while Institutional Theory provides the broader structural context for managing financial dollarization and promoting equitable financial systems. Thus, these two theories highlight the need for inclusive policies and strong institutions to achieve more equitable income distribution.

2.2 Empirical Literature
2.2.1 Impact of Financial Inclusion on Income Inequality
Previous studies have established strong connection between financial inclusion and income inequality. Beck, Demirgüç-Kunt and Levine (2007) [8] for example asserted that financial development plays a crucial role in shaping economic opportunities based on factors like skills, parental wealth, social status, or political affiliation. Under imperfect financial market conditions, financial development can impact income distribution, affecting individuals' ability to withstand income shocks (Demirgüç-Kunt & Levine, 2009). Galor and Moav (2004) [30] emphasized the link between finance, growth, and inequality, suggesting that financial development influences social welfare by creating opportunities for human capital investment across generations.

Research on the impact of financial inclusion on income inequality yields mixed results. While studies like Park and Mercado (2021) [50] posits that financial inclusion significantly reduces poverty, the evidence for its impact on income inequality remains inconclusive (Turégano & García-Herrer). In addition, Abdullah and Inaba presented strong evidence that financial inclusion, measured through indicators reflecting the level of financial access, significantly reduced poverty and income inequality in developing countries.

2.2.2 Income Inequality, Financial Inclusion and Financial Dollarization

While studies on the relationship between income inequality and financial inclusion are vast, the studies connecting income inequality and financial dollarization tends to be scarce particularly from developing countries and transition economies. De Nicoló, Honohan and Ize (2005) [22] investigate the benefits and risks associated with dollarization of bank deposits. Although, the study did not focus specifically on income inequality, however, it argued that financial dollarization is associated with financial instability that often affects lower-income groups consequently heightening income inequality. The instability that can result from financial dollarization may lead to regressive distribution of wealth in such a way that poor may be likely affect more than the rich. Similarly, Rajan and Zingales (2003) [51] argued that financial system and policies can exacerbate income inequality their investigation shows that access to foreign currency and financial product mostly skewed towards the wealthier groups of the population. Thus, this can potentially lead increase in income inequality. In addition, given that inflationary pressure pave way for dollarization, inflation control measure may be evenly distributed the rich, who have access to dollarize asset can protect their income against inflation through hedging using the dollarized assets while the poor would suffer from higher relative price thereby increasing the inequality level (Edwards & Magendzo 2001; Olayungbo & Ajuwon 2015) [25, 48].

Based on the above discussion, we derived the following hypothesis:

H_1: The relationship between financial inclusions and income inequality in Nigeria might be conditional on financial dollarization.

3. Research Methodology and Data

To test the hypothesis, based on the theoretical framework developed above, the following econometric model was specified:

$$Gini_t = \beta_0 + \beta_1 FINC_t + \beta_2 FINDR_t + \beta_3 X_t + \epsilon_t.$$

Where:

$Gini_t$= level of income inequality at time t,

$FINC_t$= proxy for financial inclusion

$FINDR_t$ = measure of financial dollarization

X_t = vector of control variables

ϵ_t = error term.

The study utilized data for the period 2003 to 2023. The data were sourced from central bank of Nigeria statistical bulletin and World Bank Development indicators data base. Data on Gini index was not reported consistently over the sample period. As such, we calculate the four-year average of the index and was included it in the model as the dependent variable in equation being a commonly employed measure of income inequality, to capture the level of income inequality (Omojolaibi, 2017) [49]. The Gini index serves as a synthetic measure, reflecting the degree of uneven distribution of income within a ranked population. The Gini Coefficient of disposable income measures the independent variable is given as a percentage. A Gini Coefficient of 0 implies a situation of perfect equality while that of 100 depicts a condition of perfect inequality.

Regarding independent variables, the study considered three measures of financial inclusion. Firstly, the percentage of people owning bank account per 1000 person. This measures of financial inclusion requires the facilitation of transactions and savings. The second measure is Bank branch per 100,000 adults. The third aspect of financial inclusion measures the number of ATM per 100,000 adults of the population. The three factors contribute towards income inequality reduction simultaneously. The number of accounts for instance indicate the accumulation of funds available for lending. People must save as a society before banks can have enough funds to lend and stimulate economic growth. The percentage of people with accounts in a financial institution is used to measure the accounts variable (Omojolaibi, 2017) [49].

Moreover, the research incorporate variables such as inflation rate (measured by the change in the consumer price index). This variable aims to capture the effects of macroeconomic management, external development, infrastructure, and social characteristics on income distribution. Its impact on income inequality depends on factors such as how people protect their income against inflation and the associated costs. The empirical impact of inflation on income inequality remains debatable, with some arguing that higher inflation tends to redistribute wealth between creditors and debtors, potentially reducing income inequality (Park and Mercado, 2015) [50]. Conversely, the low availability and high transaction cost of financial services may hinder the poor from protecting their income from inflation, exacerbating income distribution issues.

The financial dollarization variable is measured as a ratio of foreign currency held by the commercial banks as a percentage of total deposits liabilities. The variable was retrieved from central bank of Nigeria annual statistical bulletin.

The financial inclusion measures with respect to Nigeria are only available from 2003. This make our data sets to account for few observations. In regards to that, we consider an estimation technique that can best handle our dataset. In the first place we employ OLS with robust standard error. Using robust standard error will help address the issues of heteroscedasticity which is common with small sample size if autocorrelation is not detected. However, serial correlation in the dataset has been detected having checked using the Breusch-Godfery test. In order to effectively manage both autocorrelation and heteroscedasticity in the ordinary least squares standard errors, heteroscedasticity-consistent standard errors, a method introduced by Newey and West in 1987, was applied. We also consider alternative estimation technique using the Bayesian estimation for robustness check. Bayesian estimation technique is important particularly if the sample size is small and cannot provide enough information on its own. In addition, to avoid over fitting the model given the small sample size, we perform a stepwise regression. The result from the regression is presented and discussed in the next section.

4. Presentation and Discussion of the Result
4.1 Descriptive Analysis
The result of the model expressed in equation (1) are displayed in table 1 - 4. Table 1 provides the summary statistics to have an overview of the distribution of each of the variable included in the dataset. Gini coefficient for instance exhibit relatively low variability across the observations. The considerable high variability of the government spending and financial dollarization is an indication that there exists different level of fiscal policy and currency substitutions across the sample.

Table 1: Descriptive statistics

Variable	Observations	Mean	Std. Dev.	Min	Max
Income inequality	21	37.00	2.27	35.10	40.10
Inflation	21	13.43	5.11	6.60	24.66
Economic growth	21	11.15	0.80	9.51	12.22
Government spending	21	8183.48	7663.53	1225.99	24431.21
Real interest rate	21	5.48	5.69	-5.63	18.18
Real exchange rate	21	105.44	16.32	73.67	133.16
Bank branch per 1000 adult	21	4.98	0.94	3.76	6.56
No of ATMs per 100000	21	2.30	0.94	-0.39	3.00
Bank account per 1000 adult	21	688.76	307.31	296.15	1216.67
Financial dollarization	21	3027.64	2312.14	122.59	6119.43
Domestic credit to private sector	20	16.24	4.89	7.54	22.75

Source: Authors' computation, 2025

Table 2: Correlation matrix

	1	2	3	4	5	6	7	8	9	10	11
Income Ineq.	1.00										
Inflation	-0.08	1.00									
Economic Gr.	-0.89	0.12	1.00								
Govt. Spend.	-0.64	0.39	0.81	1.00							
Real Interest	-0.08	-0.05	0.10	-0.17	1.00						
Real Exch.	-0.84	0.02	0.92	0.71	0.17	1.00					
Bank Branch	0.05	-0.30	-0.20	-0.47	0.52	-0.11	1.00				
No. ATM	-0.75	0.00	0.87	0.54	0.39	0.84	0.16	1.00			
Bank Acct.	-0.79	0.32	0.92	0.90	-0.09	0.79	-0.51	0.65	1.00		
Financial Dol.	-0.82	0.26	0.94	0.88	0.08	0.85	-0.40	0.73	0.96	1.00	
Credit to Prv.	-0.63	0.14	0.75	0.42	0.51	0.70	0.36	0.85	0.53	0.63	1.00

Source: Authors' computation, 2025

Table 2 presents the correlation matrix. The result shows strong association between income inequality and other economic and financial variables included in the model. This means that financial inclusion, economic growth and other financial infrastructure indicators have strong connection in reducing income inequality. Whereas, inflation and interest rate have weaker relationship with income inequality base on the dataset presented here.

4.2 Impact of financial inclusion and Financial Dollarization on income inequality
The results presented here are based on the Newey-West estimation approach similar to the way used by Beck, Demirgüç-Kunt and Levine (2007) [8]. The results of this estimates were preferred as it accounts for autocorrelation and heteroscedasticity which were both detected in our dataset.

Table 3: Impact of Financial Inclusion on Income Inequality in Nigeria

Variables	(1)	(2)	(3)	(4)
Bank account/1000 persons	-0.0060**(0.003)			-0.0131*** (0.003)
Bank branch/100000 persons		-1.134(0.678)		-2.3952*** (0.591)
Number of ATMs/1000 persons			-0.2487(1.093)	0.1078 (0.444)
Inflation rate	0.0029 (0.066)	0.009 (0.076)	0.0122(0.067)	-0.0387 (0.050)
Credit to private sector (%GDP)	-0.0537 (0.088)	0.085 (0.152)	-0.0588(0121)	0.3235** (0.120)
Economic growth	-0.0432 (0.081)	0.321** (0.114)	0.1340(0.114)	0.0979 (0.093)
Government spending	0.0001* (0.000)	0.00005 (0.000)	0.0000(0.0001)	0.0002*** (0.000)
Real interest rate	0.0278 (0.0106)	0.060 (0.0669)	0.0523(0.097)	0.0244 (0.068)
Real exchange rate	-0.0704** (0.031)	-0.087 (0.0357)	-0.0799* (0.039)	-0.0610*** (0.026)
Constant	48.2463*** (2.791)	49.135*** (4.7392)	45.9174*** (3.558)	57.3909*** (3.337)
No. of observations	20	20	20	20
F-statistics	0.000	0.000	0.000	0.000
No. of lags used	3	3	3	3

* 10 percent, ** 5 percent, *** 1 percent level of significant. Standard errors in parenthesis

The sign of most of the variables' coefficient fall within expectation as being displayed in table 3 and 4 respectively. Table 3 displayed results of the four regression models that analyse the impact of financial inclusion on income inequality. The first 3 models use one indicator of financial inclusion at a time to estimate the impact while the 4th model incorporated all the three indicators to simultaneously determine the impact.

The coefficients of number of bank account per 1000 persons across the models are negative and statistically significant indicating that a unit increase in the number of bank accounts, reduces income inequality in Nigeria. The impact is stronger in the fourth model (-0.13), signifying that financial inclusion through increase in number of bank accounts plays a crucial role in mitigating income inequality in Nigeria. Bank branches appeared significant only in the fourth model. This also shows that expanding access to bank branches in the country can additionally reduce income inequality in the country. On the other hand, expanding the number of ATMs in the country does not significantly improve income distribution across all the models. This implies that while ATMs provide convenient platform for financial transaction, it does not directly mitigate the adverse effect of income inequality. This, perhaps, could be seen as the case where the ATMs across the nation are majorly concentrated in the urban cities, where income disparities is not widely pronounced whereas their presence in the rural areas with significantly high level of income disparities is scarce.

With respect the other control variables included in the analysis, exchange rate is consistently negative and statistically significant across the models. This suggests that a stable or currency appreciation improves the purchasing power of the household, smoothening consumption and consequently reduces income disparity. Conversely, the coefficients of government spending and interest rate have been consistently positive across the four models. With respect to government spending it is statistically significant in first and fourth models. This, on the other hand implies that government spending in this context might be hampered with inefficiency and perhaps institutional weakness in such a way that it does not benefit the lower income group, rather it worsen income distribution. Whereas, inflation rate, domestic credit to private sector and economic growth show an inconsistent behaviour in the models. Interpretation of the results might be subjected to further investigation.

Table 4 shows the relationship between financial inclusion, financial dollarization and income inequality with interaction in other to analyse the combine effect of financial dollarization and financial inclusion on income inequality. From the result, the coefficient of financial dollarization is positive and statistically significant indicating that higher level of financial dollarization is associated with greater income disparity. Although the p-value is relatively higher than the conventional significant level of 1 to 5 percent significance level, nonetheless, it indicates a marginal significant at 10% level. The economic interpretation of this result is that as the financial system becomes more dollarized, income inequality worsen probably as a result of the instability purse by dollarization as cited in the literature or due to limited access of financial service by the lower income groups of the population.

Table 4: Financial inclusion, financial dollarization and income inequality

Variables	Coefficients
Financial dollarization	18.2037* (8.8984)
Financial Inclusion.*Financial Dollarization	-0.0404** (0.0170)
Financial Inclusion *Financial dollarization	-10.6602*** (3.1994)
Inflation rate	-0.0340 (0.043)
Credit to private sector (%GDP)	0.1413 (0.100)
Economic growth	0.0777 (0.100)
Government spending	0. (0.0001)
Real interest rate	0. (0.0547)
Real exchange rate	-0.0612** (0.0266)
Constant	86.1142*** (19.982)

* 10 percent, ** 5 percent, *** 1 percent level of significant. Standard errors in parenthesis

Furthermore, the coefficient of the interaction term between financial inclusion indicator measured by the number of bank account per 1000 persons and financial dollarization is negative and statistically significant. This shows that as the level of financial dollarization increases, the positive impact of having more bank accounts among the population as a measure of financial inclusion in reducing income inequality becomes stronger. Similarly, the interaction between financial inclusion indicator (measured by the number of bank branches per 100,000 person) and financial dollarization is also negative and statistically significant. This implies also that as financial system becomes more dollarized, the adverse effect still reduced via increase number of bank branches possibly because the bank branches offer more stable and accessible financial services even in a more dollarized economy.

On the other hand, the control variables included in the model specifically inflation rate and economic growth are negative but not statistically significant. Meaning that these variables do not have impact in income inequality reduction in this context. Similarly, domestic credit to private sector is positive and also not statistically significant. The intuition is that the variable might probably amplifies income inequality largely because the credit avails by the financial institutions does not favour the lower income category of the population even though, not significant also in this context. While government spending and real interest rate were found to be positive and statistically significant marginally at 10% significance level. It thus implies that, these variable are associated with greater income inequality. It clear that as real interest rate increases, it might possibly discourage borrowing and thereby reducing consumption and

consequently worsen income distribution. The interpretation of government spending is that the expenditure might be hampered by corruption or spends in such a way the lower category of the population do not benefit from it. Exchange rate in the model appeared negative and statistically significant. It implies that appreciation in domestic currency or depreciation in exchange rate is associated with lower income inequality. Appreciation in domestic currency make export more competitive thus making sectors that benefit able to employ more labour from lower income category of the population.

Conclusion and Policy Implication
The regression analysis aimed to explore the direct impact of financial inclusion on income inequality and its indirect effect via financial dollarization in Nigeria. The model used the Gini coefficient as a measure of income inequality and included various financial inclusion indicators such as the number of bank accounts per 1,000 adults, the number of bank branches per 100,000 adults, the number of ATMs per 100,000 adults, while the ratio of foreign currency deposit to total deposits of the commercial banks was used as proxy for financial dollarization. Several control variables were used particularly inflation rate, real interest rate, exchange rate, government spending and level of economic growth.

The study provides strong evidence that financial inclusion, particularly through increased access to bank accounts and bank branches, plays a crucial role in reducing income inequality in a dollarizing economy like Nigeria. Thus policymakers should focus on expanding financial service and accessibility to reduce income inequality. The findings align with previous research, such as studies by Demirgüç-Kunt *et al.* (2018), which highlight that financial inclusion can promote inclusive growth and reduce poverty by providing low-income individuals with access to financial services, thereby enabling them to save, invest, and manage risks.

The impact of financial inclusion variable measured by number of ATMs appeared not statistically significant suggesting that financial inclusion policies should focus more on comprehensive financial services rather than merely increasing physical access to cash through ATMs. This finding is consistent with other studies, such as that by Allen *et al.* (2016) [6], which emphasize the importance of financial products that meet the needs of the poor rather than just expanding the availability of ATMs.

Based on the findings, the following recommendations are proposed. Firstly, expand Access to Bank Accounts and Branches. Policymakers should continue to promote financial inclusion by expanding access to bank accounts and branches, particularly in rural and underserved areas. This could involve incentivizing banks to open branches in less profitable regions or leveraging digital banking solutions to reach the unbanked.

Secondly, financial inclusion efforts should focus on developing financial products that meet the needs of low-income individuals, such as micro-savings, microcredit, and affordable insurance. These products can help the poor manage their finances better and reduce income inequality.

Thirdly, increasing financial literacy among the population is crucial to ensure that individuals can effectively use financial services. Educational campaigns and programs should be implemented to teach people how to manage their finances, invest, and save, thereby maximizing the benefits of financial inclusion.

Fourthly, government should adopt policies to keep inflation under control, as high inflation can negate the positive effects of financial inclusion on income inequality. Ensuring macroeconomic stability is essential for sustaining the gains from financial inclusion.

Lastly, while ATMs alone may not significantly reduce income inequality, other technological advancements such as mobile banking and digital financial services should be promoted. These technologies can reach a broader population, especially in areas with limited physical banking infrastructure. However, adopting such measures should be with caution as to avoid creating channels through which financial dollarization will be amplified to distort the effectiveness of monetary policy in stabilizing the economy in other to achieve the desired objectives. By implementing these recommendations, Nigeria can harness the full potential of financial inclusion to reduce income inequality and promote sustainable economic growth.

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