

Financial Liberalization-Poverty Nexus in Nigeria: Cointegration and Vector Error Correction Model Approach

¹Mbaeri, Amaka Clara, ²Christopher Kalu & ³Metu Amaka

^{1,2&3}Department of Economics,
Nnandi Azikiwe University, Awka

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Abstract

Poverty reduction has been a crucial issue at the Centre of global policy development in recent years. Hence, the urgent drive to eradicate poverty through the mechanisms of financial liberalization. Persistent efforts to reduce the rate of poverty through economic growth and development have been effective in producing the desired result. This paper examined the impact of financial liberalization on poverty reduction in Nigeria from 1986 to 2021 using the Granger causality approach in line with the objective of this paper. This paper was anchored on the neoclassical theory of poverty and Mckinnon-Shaw theory of financial liberalization. The data for this paper were sourced from the Central Bank of Nigeria Statistical Bulletin, National Bureau of Statistics and World Bank Development Indicator. The variables used included poverty headcount ratio (dependent variable) proxy for poverty, and index of financial liberalization (capital account, interest rate and exchange rate). The other variables include inward remittances, population growth rate, education index, health index, quality of governance and inclusive growth. The result showed implied that the shock of poverty headcount ratio based on past values had impact on the current value of poverty headcount and the shock of the included variables equally had an impact on poverty headcount ratio. From the impulse response function, poverty headcount responded negatively to financial liberalization but then draws very close at converging to equilibrium in the 4th period s and between 8th and 10th periods. This paper recommended the implementation of critical macroeconomic and structural reforms including strengthening the Strategic Revenue Growth Initiative, which can reduce crisis vulnerability and increase growth. Doing so will lift per capita income, sustainably reduce poverty and deliver better life outcomes for many Nigerians.

Keywords: *Financial Liberalization-Poverty, Nexus, Nigeria,*

Corresponding Author: **Mbaeri, Amaka Clara**

Background to the Study

A well functioning financial system is essential for development. It should be able to mobilize foreign and domestic resources and channel them to high-return investments, intermediate between savers and investors to reduce and allocate risk and provide broad access to financial, including for people on the margins of the economy (poorest of the poor) (World Bank, 2000). In so doing, finance facilitates competition, market integration, broadly based growth, and poverty reduction.

Outside South Africa, Nigeria has one of the deepest, most sophisticated financial sectors in Africa on a comparative basis, yet the financial systems are weak with limited savings for mobilization from domestic and foreign sources. Credit to the private sector is modest and often costly. Financial sectors are dominated by banks providing a small range of financial services. Therefore, harnessing finance for development and for poverty reduction will be a long process in Nigeria. Progress will require financial sector development as well as sustained financial liberalization. Indeed, Nigeria has introduced market-based reforms, but post-liberalization problems need to be addressed.

Increased access to financial services is essential and will require making borrowers more creditworthy (rather than lowering standards for formal sector credit), developing nonbank financial institutions (leasing companies, mutual funds, insurance companies), and strengthening links between formal and informal financial system. These efforts will improve quality and access to services and increase competition –financial sector governance –regulation and supervision, transparency, contract enforcement –will also require sustained attention. Many developing countries, including Nigeria lag behind in realizing the objectives of financial liberalization. Following the World Bank (2000) submission, some of the challenges affecting the realization of financial liberalization in Nigeria are: incorrect sequencing, incomplete liberalization, weak institutional framework, macroeconomic risk, market risk and microeconomic risk.

The objective of this paper is to examine the impact of financial liberalization on poverty reduction in Nigeria. Specifically, to analyze the shock of financial liberalization on poverty in Nigeria. In this paper, poverty reduction is measured by poverty headcount ratio. The headcount ratio, or percentage of the population falling below the poverty line, is widely used measure of the prevalence of poverty. The poverty gap takes into account the extent to which the consumption of the poor falls below the poverty line. The financial liberalization was measured using the indicators of interest rate, capital account and exchange rate according to Ozekhome (2022). These indicators were constructed to an index to reduce the dimensions of data using the factor analysis approach. The studies reviewed include: Horsch(1989), Olomola (1994), Pill and Pradham(1995), Ikhida(1997), Laurenncesson and Chai(2003), McDonald and Schumaker (2007), Habibullah and Eng (2006), Alege and Ogunriola(2008), Fowowe (2008), Tressel and Detragiache(2008), Khalaf (2011), Usuab et al.(2016), Akinsola and Odhiambo(2017) and Ozekhome(2022). From the empirical literature reviewed, most of these studies focused on financial liberalization and credit mobilization, others on financial development, yet others on economic growth. Hence, there is paucity of study on financial

liberalization and poverty reduction. While most of the reviewed studies are cross-country, few or little was on Nigeria. Moreover, while past studies ignored socioeconomic variables, the present study encompassed socioeconomic and institutional framework variables. This study also took into consideration the shock impact of financial liberalization on poverty in Nigeria.

The scope of the paper covered the period 1986 to 2022. The Johansen and vector error correction approaches- the impulse response function and variance decomposition were used to achieve the objectives of this paper. The variables used in the study include the poverty headcount as the dependent variable, the independent variables are the financial liberalization index (interest rate, capital account and exchange rate) constructed using the principal component analysis so as to reduce the various dimensions of measures of financial liberalization.

Methodology

Theoretical Framework

The theoretical framework of this study is formed by Mckinnon – Shaw hypothesis on financial liberalization. According to Mckinnon (1973) and Shaw (1973), financial repression reduces the real size of the financial system relative to the non-financial, which leads to slow real rate of economic growth. The theory rests on the assumptions that saving is an increasing function of real rate of interest on deposits and real rate of growth in output, and that investment is a decreasing function of the real loan rate of interest and an increasing function of the growth rate. the nominal interest rate is administratively fixed at the stage of financial repression, and thus the real rate is kept below its equilibrium level, which discourages savings and encourages current consumption. The ceilings tend to reduce the average efficiency of investment projects since investments with lower returns that would not be profitable under the higher equilibrium interest rate, are now profitable. The removal of interest rate ceiling leads to an increase in saving and average return on investment, as the low-yielding projects are no longer profitable. The real interest rate therefore is a key variable according to Mckinnon-Shaw hypothesis. Interest rate, exchange rate and account liberalization are the dimensions of financial liberalization. Increased financial openness and capital account liberalization can increase economic growth and reduce poverty through different pathways. In addition, improved risk allocation reduces risk premium, thereby lowering the cost of raising capital (Prasad *et al.*, 2003; Bekaert, Harvey & Lundblad, 2001). Also, the transfer of technology and managerial ability can raise aggregate productivity and in turn help increase economic growth.

Empirical Model Specification

The relationship the model of this study intends to estimate is derived from Ozekhome (2022) that tested econometrically the relationship between financial liberalization and poverty reduction. The model of this study is specified in its theoretical and mathematical form as follows:

$$POHC = f(\text{FINLIB, RGDP, INTR, TROP, POPG, REM, EDINDEX, HEINDEX, QLGOV, INCLG}) \quad (1)$$

Where POHC is poverty headcount ratio (the dependent variable) and FINLIB is the index(proxy) for financial liberalization; the major independent variable following the measures of financial liberalization identified by Ozekhome(2022) and the control variables are real gross domestic product (RGDP), interest rate (a proxy for macroeconomic policy), trade openness (TROP), population dynamic and trends (POPG), education index (proxy for human capital); HEINDEX (proxy for health human capital); quality of governance (proxy for government) and inclusive growth (proxy for pro-poor growth measured by infrastructure of electricity consumption).

Equation 1 can be transferred into its statistical and econometric form as follows:

$$POHC = \beta_0 + \beta_1 FINLIB + \beta_2 RGDP + \beta_3 INTR + \beta_4 TROP + \beta_5 PNG + \beta_6 REM + \beta_7 EDINDEX + \beta_8 HEINDEX + \beta_9 QLGOV + \beta_{10} INCLG + \mu_1 \quad (2)$$

The variables have already being identified, however, b_0 is the intercept, which explains the average or mean value of the model; $\beta_1 - \beta_{10}$ are the parameter coefficients and U_1 is the stochastic error term based on the assumptions of the Ordinary Least Square (OLS).

Taking the proportional effects and the linearity purposes of the equation variables, equation 3.2 can be log – linearized as follows:

$$\ln POHC = \beta_0 + \beta_1 \ln FINLIB + \beta_2 \ln RGDP + \beta_3 \ln INTR + \beta_4 \ln TROP + \beta_5 \ln POPG + \beta_6 \ln REM + \beta_7 \ln EDINDEX + \beta_8 \ln HEINDEX + \beta_9 \ln QLGOV + \beta_{10} \ln INCLG + \mu_2 \quad (3)$$

Theoretically, the relationship between foreign direct investment and poverty reduction is expected to be positive. The direct impact of FINLIB on poverty can be seen through the increase in employment and the reduction of people living below the poverty line resulting from the increase in the demand for employment, and the improvement of workforce and safety nets. In effect, we expect $\beta_1 > 0$. Rising economic growth means people spend more, more jobs are created, more taxes are paid, and workers get better pay rise. This reduces poverty. Meanwhile the converse is the case.

If RGDP is falling, then the economy is shrinking and poverty increases. Some of the economy grow without poverty reducing – Growth man syndrome. In the case of Nigeria, where these alternative scenarios have played out, we expect unambiguous coefficient for poverty, it could be positive or negative, $\beta_2 < > 0$. The lending rate is a macroeconomic policy of monetary policy. Prudent lending policy can result in low and stable inflation. Inflation hurts the poor by lowering growth and by redistributing real income. A prudent lending rate is expected to promote investment, which in turn enhances growth thereby reducing poverty. Therefore, the relationship between lending rate and poverty is expected to be positive, $\beta_3 > 0$. The relationship between trade openness and poverty is positive. Trade creates new job opportunities as raising the real wages of unskilled labour. Lowering prices of products consumed by the poor. It also improves access to external markets for the goods that the poor

produce. A percentage increase in trade openness in both the short-run and long-run is expected to reduce poverty. This study expected $\beta_4 > 0$.

High population growth traps individuals' communities and even entire countries in poverty. Achieving suitable population levels, locally and globally helps people achieve dignity and standard of living we all deserve. Therefore, $\beta_5 < 0$. Inequality is important to poverty because the relative position of individuals or households in society is considered an important aspect of their welfare (Coudouel *et al.*, 2002). Inequality is concerned with the full distribution of wellbeing; poverty is focused on the lower end of the distribution. Inequality damages economic growth threatens decades of progress towards ending poverty. Therefore, $b_6 < 0$ is ambiguously expected as the relationship between inequality measured by the Gini coefficient and poverty.

Education is related to poverty positively. Education helps to remedy many of the other issues that can help people, families, and even whole communities vulnerable to the cycle of poverty. A quality education supports a child's developing social, emotional, cognitive and communication skills which reduces poverty. Furthermore, education promotes economic growth, it reduces economic inequalities, and it increases individual earnings. It is expected that $b_7 > 0$. How does health eradicate poverty? Reduced diseases can improve economic outcomes through multiple channels: i) Greater labour productivity and school attendance from less absenteeism, ii) Better cognition and school performance through less disease in utero and in early life and, iii) Greater incentives for education and savings with lengthened life, therefore, we expected $\beta_8 > 0$, all things being equal.

The government can reduce poverty through education and health. For education by increasing the production of information and communication technology (ICT) in schools located in rural areas, encouraging periodic training to expose teachers to modern-day teaching methods, increasing teachers' incentives in order to encourage the teaching profession. In health, by increasing health expenditure, medical facilities and infrastructure, better remuneration for medical personnel and initiation of health policies that can help the poor households. Therefore, we expect a positive relationship between government and poverty.

First, high, sustainable growth will create and expand economic opportunities. Second, broader access to these opportunities will ensure that members of society can participate in and benefit from growth. Inclusive growth strategy and investments provides the opportunity for all to improve their standard of living, thereby contributing to economic growth, poverty reduction and the mitigation of extreme inequalities (ADB, 2013)

Table 1: Summary of Theoretical Assumption between Financial Liberalization and Poverty

Variables	Description	Theoretical Assumption
POHC	Poverty headcount ratio	The dependent variable
FINLIB	Financial liberalization	Positive, $\beta_1 > 0$
RGDP	Real Gross domestic – product	Ambiguous
INTR	Interest rate	Positive, $\beta_3 > 0$
TROP	Trade openness	Positive, $\beta_4 > 0$
POPG	Population growth rate	Negative, $\beta_5 < 0$
REM	Remittance	Positive,
EDINDEX	Education index	Positive, $\beta_7 > 0$
HEINDEX	Health index	Positive, $\beta_8 > 0$
QLGOV	Quality of Governance	Positive, $\beta_9 > 0$
INCLG	Inclusive Growth	Positive, $\beta_{10} > 0$

Source: Author's Compilation (2023).

Estimation Technique and Procedure

Both the impulse response function and variance decomposition are of the vector error correction model (VECM) types. However, to estimate a VAR model and to ensure that the parameters are consistent, it is usually important that the optimal lag length in the estimation procedure, since all inferences in the model depend on the correct model specification. The choice of the lag order is an important aspect of empirical research based on the VAR approach (Nkang *et al.*, 2021). The lag length selection criteria include: Likelihood ratio (LR), final prediction error (FPE); Akaike information criterion (A/C) and Schwarz information, Hannan Quinn information criteria (HQ).

Lag Length Selection Criteria

The importance of lag length determination is demonstrated in several works including Gary (2010) who posited that VAR model has used the lag length extensively in empirical studies. The author gave a flowchart of a lag length selection of multi-equation models.

Impulse Response Function

The generalized impulse response function (IRF) traces out the responsiveness of the dependent variable poverty head count ratio in the vector error correction model (VECM) to shocks of each of the variables. For each equation, a unit shock is applied to the error, and the effects upon the VECM system over the time horizon. Usually, the impulse responses functions are interpreted as something like “a one standard deviation shock to X causes significant increases (decreases) in Y for in periods (determined by the length of period for which the standard error (SE) bands are above 0 or below 0 in case of decrease) after which the effect dissipates.

Forecast Error Variance Decomposition

The essence of the variance decomposition is to measure the proportion of the forecast error variance is one variable (Poverty headcount ratio) explained by shocks in itself and the other variables. The variance decomposition indicates the amount of information each variable contributes to the other variables in the autoregression. It determines how much of the

forecast error variance of each of variables can be explained by exogenous shocks to the other variables.

Procedurally, the estimation starts with the descriptive statistics which is employed to examine the characteristics of the variables of estimate. The descriptive statistics involves the measures of central tendency and the measures of dispersion. Central tendency is defined as the Statistical measure that identifies as a simple value as representatives of an entire distribution. It aims to provide an accurate description of the entire data. The 3 most common measures are the mean, median and mode. The mode is the most frequent value. The median is the middle number in an ordered data set. The mean is the sum of all values divided by the total number of values. In statistics, the measure of dispersion helps to interpret the variability of data, i.e. to know how much homogenous or heterogeneous the data is. There are five most commonly used measures of dispersion. These are the range, variance, standard deviation, mean deviation, and quartile deviation.

The time series characteristics of the variables are examined. Zhe (2007), observed that for proper estimation of econometric models based on time series analysis, the condition for stationarity/unit root process must be satisfied. Therefore, in order to avoid spurious regression and to determine the order of integration of the variables. Stationarity of variables means that the mean and standard deviations does not change with time. The test is also used to investigate whether the mean value and variance of the stochastic process are constant over time. These are tests for stationarity including the correlogram, the Phillip- Perron and the Augmented Dickey Fuller. This study adopted the Phillip Perron (PP) and the Augmented Dickey Fuller (ADF), for the ADF, the test is carried out on each separate variable and if the calculated exceeds the tabulated ADF value, then the variable in question is stationary at the chosen level of significance and vice versa. The ADF test expands the Dickey Fuller test equation to include a higher order regressive process in the model.

$$Y_t = C + \beta t + \alpha Y_{t-1} + O_1 \Delta Y_{t-1} + O_2 \Delta Y_{t-2} + O_P \Delta Y_{t-P} + \epsilon_t \quad (4)$$

Where D is the differencing term; ADF test is conducted with the following assumptions: Null hypothesis (H₀): Series is non-stationary, or series has a unit root. Alternative hypothesis (H_A): Series is stationary of series has no unit root. If the null hypothesis is failed to be rejected, this test may provide evidence that the series is non-stationary.

Co-integration Test

The second preliminary test in recent econometric modeling is the co-integration test. The test has its development and usage following Granger's (1981) seminal paper on co-integration. The subject of co integration has received considerable attention both in empirical and theoretical econometric research (Johansen, 1988; Juselius, 1990, 1992). This is to investigate whether or not a long-run relationship exists between the explanatory and dependent variables included in the regression model.

The VECM approach is in line with the Johansen test. There are two Johansen cointegrating tests for the VECM context, the trace test and the maximal eigenvalue test. Those tests hinge

on the intuition that in the VECM, the rank of the long-run impact matrix, Π , determines if the VAR(P) variables are co integrated. The Johansen testing procedure sequentially tests the null hypothesis that the number of co integrating vectors, $k = m$ against the alternative that $k > m$.

Post – Estimation Diagnostic

Conducting various diagnostic checks (reliability) is a further attempt in econometric research to make the model more reliable and efficient for policy inference. It supports the pre-test (unit root & co-integration) earlier explained and is an important step in time series modeling. Diagnostic testing on data series thus provide information regarding how these data might be modeled. When a model is estimated, diagnostic test can be applied to evaluate model residuals which also serve as a test for model adequacy. The most three common diagnostic tests are the heteroscedasticity, the residuals serial correlation and the normality test.

Added to the diagnostic tests is the stability test. This involves an examination of the stability properties of the short-run dynamic model. Usually, the Bahmani-Oskooee and Shin (2002) cumulative sum of recursive residuals (CUSUM) and cumulative sum of squares (CUSUM Square) are used. The necessary and sufficient conditions for the test are that it is important that the recursive residual (CUSUM) and (CUSUM SQ) stay within the 5% critical boundary (represented by two straight lines whose equation is detailed in Brown Durbin and Evans (1975).

Nature and Sources of Data

The nature of the collected data for this study was all secondary data sourced from various sources. The variables except in rates and percentages are expressed in their natural logarithmic value to enhance their proportional effects and elasticity. The scope of this study is between 1986 to 2021, chosen due to data availability and to capture the various developments in the Nigerian economy. Table 3.1 presents the data set, their notation, description/measurement and source(s).

Table 2: Summary of Data Set

Notation	Description	Measurement	Source(s)
POHC	Poverty Headcount ratio	Measure for poverty	National Bureau of Statistics (NBS)
FINLIB	Foreign direct investment	Proxy for financial liberalization (US billion of dollars)	Central Bank of Nigeria (CBN)
RGDP	Real gross domestic product	Proxy for economic growth (% of GDP)	CBN
INTR	Lending rate	Proxy for financial development (% of GDP)	CBN
TROP	Trade Openness	Competitiveness of the Nigerian economy (% of GDP)	CBN Bulletin
POPG	Population growth rate	Demographic trend (% of GDP)	NBS
REM	Remittance	US Dollars	WDI
EDINDEX	Education index	Education indicators	Computed from NBS
HEINDEX	Health index	Health indication	Demographic survey / WDI
QLGW	Quality of governance	Institutional framework	World Governance Indicator
INCLG	Inclusive Growth	Infrastructure (Electricity consumption per kilo watts)	World Development Indicator

Source: Compiled by Authors (2023)

Results Presentation and Discussion of Findings

Result Presentation and Analysis

The result presentation and subsequent analysis started with the examination of the features and characteristics of the dataset in terms of measures of central tendency – it gives a picture of what the entire data is all about and the measures of dispersion – which gives information on the spread around on average. This includes the skewness, kurtosis, Jarque-Bera and the probability. Table 3 presents the results of the descriptive statistics.

Table 3: Summary of Descriptive Statistics

POHC	FINLIB	RGDP	INTR	TROPEN	POPGR	REM	EDINDEX	HEINDEX	QLGN	INCLG
Mean 44.13056	1.634609	40361.15	18.53281	16.56126	1.41E+08	43.96474	0.631178	0.237454	-1.060652	72.530
Std Devia 9.534133	1.242622	19660.12	4.056755	14.39703	38670892	2.711964	0.076609	0.025091	0.114085	23.81
Skewness 0.097000	1.707184	0.413540	0.824812	0.407873	0.325711	1.478503	0.404787	4.294645	-1.059820	-0.140
Kurtosis 1.5436326	5.865796	1.58268	4.847184	1.691058	1.87074	4.576775	2.335034	22.50003	5.3232516	1.972
Jarque – Bera 3.237	29.80603	4.028294	9.200063	3.568155	2.524604	16.84515	1.646347	681.6404	14.83559	1.700
Probability 0.198102	0.0000	0.133434	0.010063	0.167952	0.283002	0.000220	0.439036	0.000000	0.000600	0.427
Sum 1588.700	58.845	1453001	667.1812	596.2053	5.06E+09	158.731	22.72242	8.548332	-38.18348	2611.00
Sum Sq. Dev. 3181.756	54.0438	1.35E+10	576.0041	7254.606	5.23E+16	257.4162	0.205412	0.022034	0.455542	19856
Obser 36	36	36	36	36	36	36	36	36	36	36

Note: POHC = Poverty head count ratio; FINLIB = Financial liberalization index; RGDP = (Economic Growth); INTR = Interest rate ; TROPEN = Trade openness; POPGR = Population growth; REM= Remittance; EDINDEX = Education index; HEINDEX = Health index; QLGOV = Quality of Governance; INCLG = Inclusive Growth

Source: Authors' Computation using EView 12.

The skewness results show that POHC, QLGOV and INCLG were all negatively skewed. This means that the tail of the distribution curve is longer on the left side. This means that the tail of the distribution curve is longer on the left side. This means that the outliers of the distribution curve are further out towards the rising and closer to the mean on the right. The interpretation holds for the positively skewed values of the descriptive statistics. From the result on the kurtosis, the results show that FINLIB, LNDR, GINI, HEINDEX and QLGOV are the standard value of kurtosis which is 3 and this implies that the distribution is neither high nor low. The values above 3 indicate leptokurtic – distribution. This implies that the data set has heavier tail than a normal distribution. For variables POHC, RGDP, TROPEN, POPGR, EDINDEX, and INCLU, the values fall within the acceptable values. The Jarque-Bera coefficients are non-negative. This implies that the null hypothesis is accepted that the dataset is normally distributed and the alternate hypothesis that the dataset does not come from a normal distribution is rejected. The probability values (p-values) for FINLIB, LNDR, GINI, HEINDEX and QLGOV are significant. On the whole, we have 36 observations. In other words, the set of data points actually collected for this study.

The correlation matrix test presented in the next table showed the movement of the explanatory variables, i.e., whether the variables are exerting the same influence on the dependent variable POHC.

Table 4: Summary of Correlation Matrix

Correlation	POHC	FINLIB	RGDP	INTR	TROPEN	POPGR	REM	EDINDEX	HEINDEX	QLGN	INCLG
POHC	1.00000										
FINLIB	0.289117	1.00000									
RGDP	-0.943106	-0.324034	1.0000								
INTR	0.494549	0.492876	-0.428277	1.0000							
TROPEN	-0.912266	-0.372809	0.973279	-0.501521	1.0000						
POPGR	-0.883053	-0.338266	0.954245	-0.445644	0.987843	1.0000					
REM	0.076592	0.037034	-0.341708	-0.060866	-0.398236	-0.459319	1.0000				
EDINDEX	-0.869311	-0.341223	0.913875	-0.505490	0.967362	0.985405	-0.432808	1.0000			
HEINDEX	-0.493074	-0.261634	0.544329	-0.400168	0.616510	0.628390	-0.236282	0.596055	1.0000		
QLGOV	0.640304	0.173890	-0.600383	0.229368	-0.661903	-0.713555	0.203350	-0.760537	-0.378192	1.00000	
INCLG	-0.802244	-0.287305	0.912801	-0.359255	0.947688	0.97100	-0.572780	0.954472	0.554715	-0.6704781	1.0000

Note: POHC = Poverty head count ratio; Financial liberalization; RGDP = Economic Growth; INTR = Interest rate; TROPEN = Trade openness; POPGR = Population growth; REM= Remittance; EDINDEX = Education index; HEINDEX = Health index; QLGOV = Quality of Governance; INCLG = Inclusive Growth

Source: Author's Computation using Eview

Table 5: Summary of ADF Unit Root Test Results

	Levels			First difference			Order of Integration
Variables	ADF	Critical value (5%)	P-value	ADF	Critical value (5%)	P-value	
POHC	-3.899045**	-3.052169	0.0052	-5.675309	-3.052169	0.053	I(1)
FDI	-3.950092**	-3.052169	0.0044	-4.45678	-5.678651	0.1234	I(1)
RGDP	-2.113029	-3.052169	0.0021	-4.299298**	-3.052169	0.0159	I(1)
LNDR	-1.10234	-3.052169	0.0000	-6.5433	-3.052169	0.0024	I(1)
TROPEN	-2.11428	-3.052169	0.0000	-7.124800	-3.05216	0.0159	I(1)
POPGR	0.808597	-3.052169	0.9924	-4.280040	-3.05216	0.0159	I(1)
GINI	-3.3763	-3.052169	0.0190	-5.234561	-6.765890	0.2341	I(1)
EDINDEX	-1.10234	-3.052169	0.0000	-5.829019	-3.052169	0.0036	I(1)
HEINDEX	-1.2045	-3.052169	0.0000	-9847879	-3.052169	0.0036	I(1)
QLGOV	-2.113029	-3.052169	0.0012	-8.41372	-3.052169	0.0142	I(1)
INCLG	-2/11028	-3.052169	0.0011	-4.00731	-3.052169	0.0028	I(1)

Source: Authors' Computation using EView 12

Table 6: Summary of PP Unite Root Test Result

	Levels			First Difference			Order of Integration
Variables	PP	Critical value (5%)	P-value	PP	Critical value (5%)	P-value	
POHC	-1.10234	-3.052169	0.0000	-4.09137**	-3.052169	0.0031	I(1)
FDI	-3.959885**	-3.052169	0.0043	-5.056431	-3.052169	0.0567	I(1)
RGDP	-1.077177	-3.052169	0.7138	-5.24630	-3.052169	0.024	I(1)
LNDR	-3.015584	-3.052169	0.0432	-4.12345	-3.052169	0.0245	I(1)
TROPEN	-1.24625	-3.052169	0.0523	-7.261795	-3.052169	0.0000	I(1)
POPGR	-2.11428	-3.052169	0.7248	-17.11762	-3.052169	1.0000	I(1)
GINI	-3.477572	-3.052169	0.0149	-4.12345	-3.052169	0.0002	I(1)
EDINDEX	-1.11024	-3.052169	0.8124	-5.21837	-3.052169	0.0002	I(1)
HEINDEX	-2.11428	-3.052169	0.9240	-9.847871	-3.052169	0.0000	I(1)
QLGOV	-2.11435	-3.052169	0.7256	-12.11273	-3.052169	0.0000	I(1)
INCLG	-1.24628	-3.052169	0.62541	-11.052169	-3.052169	0.0000	I(1)

Source: Authors' Computation using EView12

Note: The tests include intercepts with trend; ** implies significant at 5%

Table 7(a) and 7(b) showed the result of the stationarity test. It suggested that the variables are stationary at the first difference using the Augmented Dickey-Fuller test and Philip – Peron. Co-integration then becomes an overriding requirement for any economic model like of this study using non-stationary time series data. If the variables do not co-integrate, there will be problems of spurious regression and the econometric model becomes meaningless. Two variables (POHC and the covariates) will be co-integrated if they have a long-term, or equilibrium relationship between them. Table 7 presents the co-integration test using the Johansen co-integration technique.

Table 7(a): Johansen Co-integration Test Result

Date: 03/10/23 Time:13:06				
Sample (adjusted): 1988 2021				
Included Observations: 34 after adjustments.				
Trend assumption: Linear deterministic trend				
Series: POHC FDI RGDP LNDR TROPEN POPGR GINI EDINDEX HEINDEX QLGOV INCLG				
Lag internal (in first differences): 1 to 1				
Unrestricted Co - integration Rank Test (Trace)				
Hypothesized No of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob**
None*	0.999517	836.8471	285.1425	0.0000
At most 1*	0.993947	577.2279	239.2354	0.0000
At most 2*	0.972675	403.5803	197.2354	0.0000
At most 3*	0.916344	281.1819	159.5297	0.0000
At most 4*	0.819427	196.8267	125.6154	0.0000
At most 5*	0.715086	138.6316	95.75366	0.0000
At most 6*	0.607233	95.94235	69.81889	0.0001
At most 7*	0.486289	64.16803	47.85613	0.0007
At most 8*	0.467289	41.52080	29.79707	0.0015
At most 9*	0.386683	20.07064	15.49471	0.0095
At most 10	0.096464	3.448931	3.841466	0.0633

Note: Trace test indicates 10 co-integrating eqn.(s) at the 0.05 level * denotes rejection of the hypothesis at the 0.05 level ** Mckinnon-Haugh Michelis (1999) P-value

Source: Authors' Computation using EView 12

Table 7(b): Max Eigen Cointegration Test

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob**
None*	0.999517	259.6191	70.53513	0.0001
At most 1*	0.999347	173.6476	64.50472	0.0000
At most 2*	0.972675	122.3984	58.43354	0.0000
At most 3*	0.916344	84.35523	52.36261	0.0000
At most 4*	0.819427	58.19610	46.23142	0.0018
At most 5*	0.715086	42.68926	40.07757	0.0248
At most 6	0.607233	31.77432	33.87687	0.0873
At most 7	0.486289	22.64723	27.58434	0.1890
At most 8*	0.467880	21.45015	21.13162	0.0451
At most 9*	0.386683	16.62171	14.26460	0.0208
At most 10	0.096464	3.448931	3.841466	0.0633

Max-eigen value test indicate 6 co-integration eqn. (6) at the 0.05 level. * denotes rejection of the hypothesis at the 0.05 level. * Mackinnon

Source: Authors' Computation using EView 12

Tables 8 present the co-integration results using the trace statistics and the maximum Eigenvalue (Rank) tests. From the result presented, there are 10 co-integrating vector using the trace statistics at the 0.05 level of significance, while the max Eigen value showed co-integrating vectors. These results conform the presence of long-run relationship between poverty headcount ration and the covariates of foreign direct investment, economic growth, lending rate, trade openness, population growth and inequality. The remaining variables are health index, quality of governance and inclusive growth. Indeed, the issue here is to have non-stationary variables in order to detect among them stationary co-integrating relationship(s) at the 0.05 level of significance. We therefore reject the null hypothesis and accepted the alternative hypothesis and concluded that there is a long-run relationship between poverty reduction and financial liberalization (long-run equilibrium relationship).

The next consideration is the determination of the appropriate lag length of the model. The issue of finding the appropriate (optimal) lag length is very important because, there is the need to have Gaussian error terms (that is standard normal error terms from non-normality, autocorrelation, heteroscedasticity and so on) setting the value of the lag length is affected by the omission of variables, that might affect the model. Table 8 presents the lag order selection criteria for POHC and FDI

Table 8: VECM Lag Order Selection Criteria for POHC and FDI

Endogenous variables: LOG (ASI) LOG (FDI)

Exogenous variables: C

Date: 03/10/23 Time: 13:06

Sample: 1988 2021

Included Observations. 34

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-95.04535	NA	1.795495	6.260990	6.353505	6.291148
1	14.61716	198.1000	0.001968	-0.555946	-0.278400	-0.465473
2	15.83802	2.047895*	0.002366*	-0.376646*	0.85930	-0.225858
3	18.24892	3.733004	0.002648	-0.274124	0.373483	-0.063020
4	19.19841	1.347671	0.003284	-0.077317	0.755321	0.194102

* Indicate lag order selected by the criterion

LR: Sequential modified LR test Statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information Criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Source: Authors' Computation using EView 12

The selection of lag 4 gave the result of Table 8. The result in Table 8 showed that the optimal lag length is 2. Therefore, the VECM (2) model is the preferred model and should be considered for further analysis.

Next, we presented the direction of relationship between poverty and financial liberalization. As emphasized, for a bi-variate case, we employed the usual pairwise Granger causality test, the f-test. Table 9 presents the result of the pairwise causality test.

Table 9: Variance Decomposition of POHC

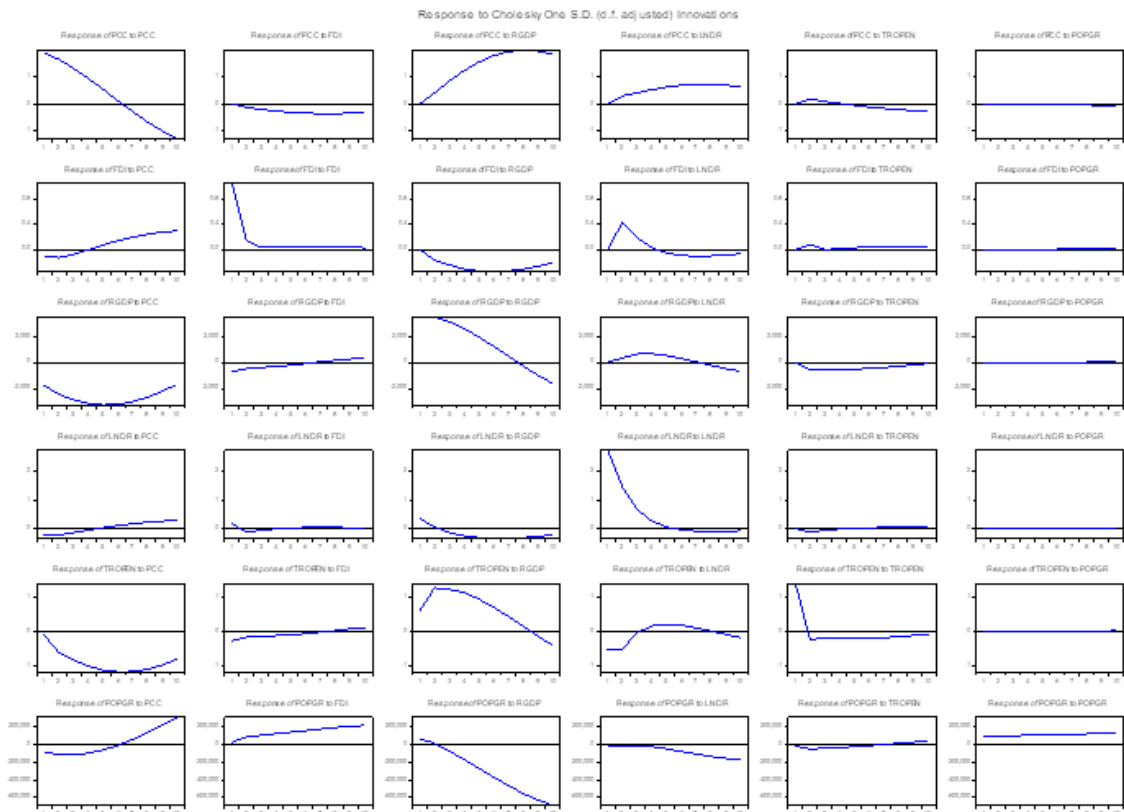
Variance Decomposition of POHC Period	S.E	POHC	FINLIB	RGDP	INTR	TROPEN	POPGR	REM	EDINDE X	HEINDE X	QLGOV	INCLG
1	1.09999	100.0000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
2	1.746107	56.70522	3.311444	1.358682	6.884595	1.343399	16.34866	0.321358	2.829117	0.293189	10.34256	0.261772
3	23.56994	1.111912	25.51892	30.56527	2.855560	0.807819	11.50478	18.66328	7.627344	1.274010	0.066726	0.004375
4	49.00640	0.484955	16.50891	33.9114	1.180701	1.837197	16.38264	22.88302	5.537860	1.216193	0.031643	0.025748
5	63.97838	0.424666	9.889271	39.40759	0.926440	3.859186	18.59066	21.71581	4.096013	1.031433	0.018569	0.040358
6	488.0850	1.374296	29.93957	27.40878	2.719691	0.361371	9.098712	18.42639	9.3044601	1.365309	0.000654	0.00770
7	437.995	0.522815	19.08065	32.95673	1.386302	1.488795	14.66762	22.02120	6.5712991	1.281381	0.010389	0.013811
8	2596.855	0.530969	12.00797	38.27454	0.516065	2.732102	17.03398	22.49585	5.218297	1.162971	0.003860	0.023397
9	9320.767	1.566756	33.89778	24.66244	3.406793	0.2644634	7.679627	17.18389	9.970938	1.362530	0.000358	0.004259
10	37784.06	0.639235	21.91055	31.41092	1.751020	1.108003	13.29625	21.32683	7.226904	1.313948	0.008201	0.008140

Source: Authors' Computation using EView 12

The variance decomposition determines how much of the forecast error variance of each of the variables can be explained by exogenous shocks to the other variables. The forecast error variance decomposition is interpreted in line with the vector autoregressive estimates. There are two major variables – poverty, itself which could be strongly endogenous or weakly endogenous in the two major horizons (1-5 and 6-10) period. It shows the percentage changes in a particular variable (poverty) due to its own changes and had many changes that was accounted for by another variable (financial liberalization) at different periods in time. from the result in Table 9, the variance decomposition result reported within a 10 – year horizon showed that in the first (1st period), FINLIB, RGDP, INTR, TROPEN, POPGR, REM, EDINDEX, HEINDEX, QLGOV and INCLG accounted for no changes (or zero percent) increases, in POHC and as such showed that 100 percent changes in POHC are due to its own shocks.

In the second (2nd) period, these variables accounted for about 3.311; 1.36; 6.88; 1.34; 16.35; 0.32; 2.82; 0.29; 10.34 and 0.26 percent changes in POHC whereas, 56.71 percent changes (or innovation) are due to its own shocks. However, in the 10th period, 0.64 percent of innovations (or percentage change) in POHC are explained by its own past values, yet only 21.91; 31.41; 1.75; 1.10; 13.29; 21.32; 7.22; 1.31; 0.008 and 0.008 percent of the innovations (or percentage changes) is due to shocks of the included variables – FINLIB, RGDP, INTR, TROPEN, POPGR, REM, EDINDEX, HEINDEX, QLGOV and INCLG. Also, in the first (1st) to the 10 – year periods, the variables accounted for percentage changes in POHC and POHC innovations or percentage changes can be attributed to shocks due to POHC. This result implied that the shock of POHC based on past values had impact on the current value of POHC and the shocks of the included variables equally had an impact on POHC.

Figure 1: Impulse Response Functions



Source: Authors' Computation using EView 12

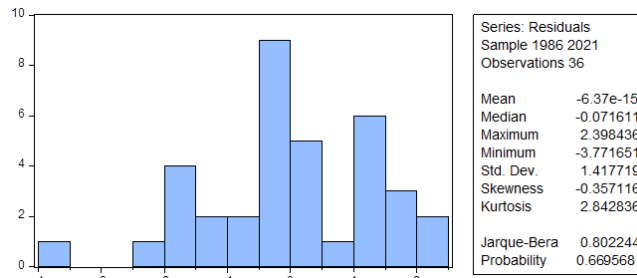
Figure 1 presents the impulse response functions. It shows the effects of shocks on the adjustment path of the variables in the VECM model. It traces the effect of a one-time shock to one of the innovations on current and future values of the endogenous variables. The impulse responses as shown in figure 1, indicated that POHC responded negatively to FDI, RGDP, LNDR, TOPEN, POPGR, GINI, EDINDEX, HEINDEX, QLGVOV, and INCLG shocks, but then draws very close at converging to equilibrium in the 4th periods and between 8th and 10th periods. These variables however, responded positively to shock from POHHC. The dependent and independent variables however, responded positively to own shocks from innovation within the financial liberalization regimes. Table 9 presents the residual diagnostic test results

Table 10: Residual Diagnostic Test Results

Residual Diagnostic Tests	F – Statistic	Prob.
Serial Correlation LM	1.567678	0.2300
Heteroscedasticity Test	0.677044	0.7351
Jarque – Bera	0.802244	0.669568

Source: Authors' Compilation using Eview 12.

Figure 2: Jarque-Bera Result

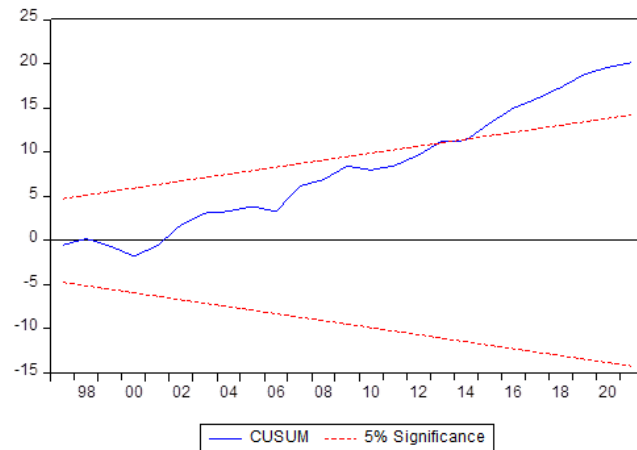


Source: Authors' Plot using EView 12

Model Stability Test

In line with the stability, this study used the cumulative residual and cumulative sum of squares to show the stability of the model for policy. Figure 4.2 show the result.

Figure 3: Stability Test



Source: Authors' plot using EView 12

From the model from the graph above using it shows that the variables are slightly stable. That means that the model exhibit stability over time and can be used for forecasting.

Discussion of Findings

The result showed that in the first period, the included variables accounted for no changes (or zero percent) increases in poverty and showed that 100 percent changes in poverty are due to

its own shocks. In the second period, these variables accounted for about 3.31, 1.36; 6.88; 1.34; 16.35; 0.32; 2.82 and 0.26 percent changes in poverty, whereas 56.71 percent changes (or innovations) are due to its own shocks.

From the impulse response function, it was suggested that poverty responded negatively (negative shock) to the included variables, but draws very close converging to equilibrium in the 4th periods and between 8th and 10th periods. These variables, however, responded positively to shocks from poverty. These results implied that financial liberalization has produced both negative and positive shocks on poverty reduction in Nigeria (Chukwudi *et al.*, 2015) has identified lack of policy framework, lack of security and terrorism attack, militancy and youth restiveness, political and economic challenges, risks, lack of infrastructure, bribery and corruption, obsolete land use Act, absence of market and discriminating practices as some of the shocks of FDI in Nigeria and in extension to poverty reduction. The result of this study and the discussions thereof calls for some policy actions.

Policy Implication of Findings

The policy implication of the findings is summarized as follows: The results from the variance decomposition and impulse response function show that financial liberalization has negative and positive shock on poverty reduction IN Nigeria.

Conclusion and Policy Recommendation

Conclusion

The conclusion was based on the objectives of this study –The objective of this study is to analyze the shock impact of financial liberalization and poverty reduction in Nigeria. The result shoed that in the first period, the included variables accounted for the changes (or zero percent) increases in poverty and showed that 100 percent changes in poverty are due to its own shocks. In the second period, those variables accounted for about 6.88 to 0.26 percentages changes in poverty, whereas 56.71 percent changes (or innovations) are due to its own shocks.

By implication, financial liberalization produced both negative and positive shocks on poverty reduction in Nigeria.

Policy Recommendations

The following policies from the policy implications are recommended:

- i. The government must take steps to boost investment by foreigners in the country. Policy measures like enhancing the nation's security profile and providing well-structured tax holidays to foreign investments can create jobs thereby reducing poverty in the economy.
- ii. Since, there's no causality between financial liberalization and poverty, the policy makers should build real partnership among relevant government agencies, banks, Non-governmental organizations, and community based organizations (CBOS) and group beneficiaries in credit administration.
- iii. The political system should be enhanced and made more transparent and the demand

- for locally made goods and services, which will in turn burst local productivity, and ultimately increase employment for poverty reduction.
- iv. The education sector needs to be strengthened. This can be through the strengthening of the social safety net programmes such as conditional cash. This will increase the disposable income of poor households, thereby promoting school participation.
 - v. Use and upgrade of more non-formal educational institutions to enhance skill acquisition for those citizens outside of formal education.
 - vi. Redistributive policies and programmes are needed to reduce the level of risks and shocks. The latter include programmes aimed at enhancing incomes, job opportunities and wealth creation through vocational skills training, micro-credit and micro enterprise development.
 - vii. Re-prioritizing educational policy towards entrepreneurship, and Technical and Vocational Education and Training (TVET) stream will narrow the skills gap and reduce poverty in Nigeria.

Contribution to Knowledge

This study has contributed to the extant knowledge in three major dimensions – theoretical/conceptual, empirical and policy dimensions.

Theoretical / conceptual dimension: This study utilized the McKinnon – Shaw hypothesis thereby showing the applicability of the theory in the Nigerian context. Furthermore, the constructed conceptual framework showed the links between financial liberalization and poverty reduction. Again, the theoretical framework and the model built therefrom is a theoretical addition to extant knowledge.

Empirical / Methodological relevance; the use of foreign direct investment (FDI) as a measure of financial liberalization following Ozekhome(2022) contributory. Trade openness has mostly been used as a measure of financial liberalization. Again, the inclusion of more explanatory accounting for multicollinearity is a value-addition as it promotes the robustness of the discussion.

The policy initiatives from this study would serve as a blue-print to the government and policy-makers on how to promote financial liberalization for poverty reduction. This study would also be useful to households and firms as agents of the economy.

Agenda for Further Research

This study examined financial liberalization and poverty reduction in Nigeria. A simple country-specific study. It is suggested that future studies should consider cross-country study. Future studies also consider a logistic regression of the impact of financial liberalization on household poverty in Anambra State.

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