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Financial Development and Income Inequality in Nigeria: An Empirical Investigation

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Abstract
This study investigates the impact of financial development on income inequality in Nigeria using secondary data from the World Development Indicators database and the Standardized World Income Inequality Database (SWIIDspanning from 1990- 2021. The methodology employed includes the ADF test for unit root, the Johansen Test for Co-integration, the Ordinary Least Square(OLS) Technique, and diagnostic tests like the normality test, Stability test, Granger causality test.The explanatory variables were financial deepening (FID), credit to the private sector (CPS), bank capital to asset ratio (BCAR), population growth (POP), and trade openness (TOP) while the dependent variable is the Gini coefficient (GINI) proxy for financial development. The unit root test result shows that the variables are in the same order of stationarity, they were all stationary at first difference. The Johansen Test for Co-integration shows that there is a long-run relationship between the variables in the model. The OLS results of the analysis show that financial deepening (FID) and bank capital to asset ratio (BCAR) have a negative relationship with income inequality in Nigeria with financial deepening having a significant relationship with income inequality; and bank capital to asset ratio have an insignificant relationship with inequality. The results also show that Credit to the private sector (CPS), population growth (POP), and trade openness (TOP) maintain a positive and insignificant relationship with income inequality in Nigeria. Based on the findings,the study recommends that policymakers should focus on several key strategies, capable of promoting financial deepening through initiatives like expanding banking services to underserved areas.

Keywords: Financial Development, Income Inequality, Bank Capital, Nigeria

Introduction

Financial development is critical to the reduction of income inequality.According to Tiwari et al. (2013), the rise of the financial sector contributes to increased economic growth, which reduces income disparity in two ways. First off, investments typically become more alluring when

borrowing is more affordable. Small business owners, therefore, want to grow to increase profits. As a result, increased financial growth, employment prospects, output creation, and the welfare of the poor all move in the same direction. Secondly, because families can send their kids to receive a higher level of education and health care, which is a ladder to escape the poverty trap, borrowing at a reasonable cost will also raise the quality of human capital.Furthermore, according to Gharleghi (2020), the expansion of the financial sector is crucial in reducing income disparity since it enables people to become more productive by starting businesses and other ventures.By fostering an atmosphere that makes financial services easily accessible to the most vulnerable, a strong financial system has the potential to lower poverty and inequality. The services include credit disbursement, savings mobilization, and offering grassroots clients microinsurance services (Sara and Alessio, 2017). Additionally, it might offer training and advising services to help people develop their financial literacy. Particularly, the growth of the financial failure. More job prospects for the impoverished are made possible by the availability and ease of finance to microenterprises (Daouda,2015) while improving more equitable income distribution (Omojolaibi, 2017; Adams and Klobodu, 2016).

Statement of the Problem

In Nigeria, income disparity has been a recurring issue with a range of socioeconomic repercussions. The country has experienced significant economic growth in recent years, driven by factors such as oil production, foreign investment, and government initiatives. The advantages of economic expansion have not, however, been distributed equally among the population, which has widened wealth gaps (Aigbokhan, 2018). Income inequality can hinder poverty reduction efforts, exacerbate social tensions, and impede sustainable development (Akpan & Udoh, 2019). Simultaneously, financial development is recognized as a key determinant of economic growth and poverty reduction. A well-developed financial system facilitates the efficient allocation of resources, promotes investment, and supports entrepreneurship (Asongu & Nwachukwu, 2017). Despite the potential benefits of financial development, its impact on income inequality remains a subject of debate. While some studies argue that financial development can exacerbate income inequality due to unequal access to financial services (Beck, Demirgüç-Kunt, & Levine, 2007), others suggest that it can reduce inequality through increased access to credit and investment opportunities (Greenwood & Jovanovic, 1990).

In the Nigerian context, the relationship between financial development and income inequality has received limited attention in the literature. Previous studies have primarily focused on examining the effects of specific financial sector reforms or the relationship between financial development and economic growth (Akinlo&Egbetunde, 2013; Olayiwola, 2019). However, a comprehensive analysis of the linkages between financial development and income inequality in Nigeria is lacking.Therefore, the central problem of this research work is to investigate the relationship between financial development and income inequality in Nigeria and provide empirical evidence to determine whether financial development exacerbates or alleviates income inequality.

Operational Hypotheses

The following hypotheses were formulated to guide this study

H_{01}: There is no relationship between financial deepening and income inequality in Nigeria.

H_{02}: There is no influence of credit to private sectoron income inequality in Nigeria.

H_{03}: There is no effect ofbank capital-to-asset ratioon income inequality in Nigeria.

Conceptual and Theoretical Issues

Conceptual Clarification

This study grapples with the concepts such as income inequality, financial development, and the relationship between income inequality and financial development.

Concept of Income Inequality

Income inequality refers to the unequal distribution of income among individuals or households within a particular society or country. It is a multidimensional issue that encompasses various economic, social, and political factors. Osberg (2015) defined income inequality as the unequal distribution of income and opportunity between different groups in a society. Alternatively, the

World Bank (2020) denotes income inequality as disparities in income levels or earnings across individuals or households within a particular social group, often measured through statistical indices or measures such as the Gini coefficient.

Concept of Financial Development

Financial development is the process of strengthening and extending an economy's financial systems, which includes the creation of financial institutions, markets, and instruments. It entails expanding and deepening financial intermediation, improving financial access and inclusion, and fortifying financial infrastructure and laws (Levine, 2005). Beck, Demirgüç-Kunt, and Levine (2000) propose another definition, defining financial development as "improvements in the functioning of financial institutions and markets that promote savings mobilization and efficient resource allocation". This definition stresses the function of financial institutions and markets in facilitating savings mobilization and effective resource allocation, emphasizing their relevance in promoting economic development. In summary, financial development is the improvement and expansion of financial systems, institutions, and markets to promote economic growth through better resource allocation, savings mobilization, and risk management.

Relationship between Financial Development and Income Inequality

Gharleghi (2020) stated that financial growth is critical in reducing income inequality since financial services enable people in society to be more productive, such as by starting a business.Koh et al. (2019) described that well-developed financial sectors lead to an inequality-narrowing effect in the longrun through the easiness of firms to access capital, which is an essential input to increase the companies' productivity and performance. Consequently, the advantages trickled down to society through the creation of jobs and which reduce unemployment, and income inequality. On the other hand, according to current developments, a financial system will help rich individuals since they will gain financial access, which will push them to earn much more money. However, financial accessibility for the poor is limited. As a result, while economic growth will increase, income inequality will rise.

Theoretical Framework

This work is guided by the financial imperfection theory and Kuznets theory of inequality. The financial imperfection theory was proposed by Galor and Zeira (1993). The assumption is based on the existence of market economic constraints that impede access to finance. These constraints exist in the form of transaction and information costs and they limit people's access to finance, and these constraints arise because of imperfections in the market system. Therefore, financial imperfection causes financial development to negatively affect income inequality (Mookerjee & Kalipioni, 2010). This theory points to the need for differentiating between financial access and financial depth (mostly used to capture financial development) dimensions. Thus, the presence of

financial constraints is harmful as it can be responsible for excluding people from accessing financial products and services, which affects the ability of an individual to invest in human capital, thereby leading to persistence in income inequality (Kling et al., 2022).

Furthermore, Galor and Zeira (1993), Banerjee and Newman (1993) and Galor and Moav (2004) argue that financial constraints will be eased as the financial system develops, thereby improving access to finance. Consequently, the development of the financial system should not be solely based on the evaluation of the size of the financial system. Financial development without increased access to finance would foster income inequality. In this vein, financial development could facilitate capital allocation efficiency (Thornton & Tommaso, 2020; Zhang & Naceur, 2019). Therefore, this study evaluates how financial development dimensions affect income inequality in Nigeria.

Similarly, Kuznets theory of inequality proposed in 1955 talk about the movement of disparity in rich and poor countries. The United States and the United Kingdom were among the countries with the greatest reductions in income disparity ever recorded in history, along with rapid economic expansion.The Kuznets hypothesis was chosen because it accurately depicts the relationship between income inequality and major economic factors like per capita income.According to the Kuznets inverted 'U' hypothesis, an indicator of income inequality (Gini coefficient) should first be positively correlated with per capita income growth or economic development; then, after the economy has reached the apex of the curve, an inverse relationship between the two variables should be observed in a subsequent period. Although Kuznets originally linked economic growth to inequality, the concept has lately been expanded to incorporate other macroeconomic concerns such as pollution, poverty, and technology (Cassette, Fleury & Petit, 2012; Gruber & Kosack, 2014). Kuznets developed the inverted 'U' hypothesis to explain the growth of income disparity as an economy transitions from an agriculturally dominant structure to a more sophisticated, industrialized, or service-based economy.

The following are the starting conditions that exist before the inverted 'U' Kuznets hypothesis takes effect: First, in an agrarian economy, where relatively low per capita income abounds and there is unlikely to be a considerable degree of income inequality. Second, in comparison to the rural agricultural sector, the industrial urban component of the economy will be small. This industrial urban sector will be distinguished by higher per capita income and, possibly, a larger degree of income inequality.

Empirical Issues

Different studies have been conducted on financial development and its impacts on income inequalityin different economies. However, some such studies have been selected as essential for this research. Okafor,Olurinola,Bowale, and Osabohien (2023) empirically examine how financial development affects income inequality in Africa. Financial development dimensions, access, depth, efficiency, and stability were considered to achieve the study's objective. The study applied the system generalized method of moments (SGMM) to analyse data and the findings showed that each dimension of financial development had a varying impact on income inequality. Access, stability, and efficiency components of financial development reduce income inequality, while the depth dimension of financial development exacerbates income inequality in Africa. Therefore, the study recommends that policymakers should not neglect other dimensions of finance in facilitating economic development.

Sotiropoulou, Georgopoulos, and Giakoumatos (2022) investigated the causality between financial development, economic growth, and income inequality using panel data for 23 European Union countries over the period 1987- 2017. Various proxies of financial development

are chosen to represent the depth, efficiency, and stability of the banking system and stock markets. For the empirical analysis, the study performs the Granger non-causality test in heterogeneous panels. The findings are contradictory and sensitive to the measures of financial development. Most importantly, the results reveal a one-way causality from financial development to economic growth when private credit, stock market capitalization, net margin interest rate, and Z-score are chosen as financial development indicators. In addition, a two-way causality exists between bank assets, liquid liabilities, non-performing loans, and economic growth, and a one-way causality from economic growth to value traded and turnover ratio. However, the results show no causality between stock price volatility and economic growth. The results indicate a one-way causality running from income inequality to economic growth. Finally, a one-way causality runs from income inequality to financial development for most measures of financial development except for a one-way causality running from private credit to income inequality, a two-way causality between bank assets and inequality, and an absence of causality between income inequality and turnover ratio, Z-score and stock price volatility.

Igwegbe and Metu (2021) assessed the determinants of income inequality in Nigeria using annual time series data from 1981 to 2018. The data were estimated using the fully modified ordinary least square (FMOLS) technique. Factors identified as having affected income inequality during the period include the level of economic development attained, technology, globalization, fiscal policy, rural-urban drift, and financial access. The result also showed that the relationship between income growth and income inequality over time was linearly monotonic, rather than inverted U-shape as stipulated in the Kuznets hypothesis. Based on the findings, it is recommended, among others, that there should be a strengthening of technological progress through the adoption, adaptation, and diffusion of existing technologies to address technology-induced inequality in Nigeria.

3.0 Methods and Materials

Research Design

This study adopts an ex post facto research design. It is ex post facto in that it deals with data and information already generated by previous scholars or computed by relevant data agencies and is not subject to the researcher's manipulation. Thus, the study will examine the impact of financial development and income inequality in Nigeria over the period, (1990 - 2021).

Sources of Data Collection

The method of data collection is documentary. Current, relevant, and rich data/literature were sourced from the World Development Indicatorsdatabase. Unfortunately, the WDI does not provide sufficient data on income inequality. In response to the problem, the Standardized World Income Inequality Database (SWIID), proposed by Solt (2016), was utilized. Our choice was largely based on data availability. Together with emerging countries, the SWIID also covers income inequality data for other countries, constituting a database of 192 countries, with the first observation dated back to 1960. Note that only the Gini coefficient is provided in the SWIID database.The data used for this study are time series data covering 1990 to 2021.

Model Specification

To evaluate financial development and income inequality in Nigeria, we specify the following functional model, which is anchored on the financial imperfection theory.

$GINI = f(FID, CPS, BCAR, POP, TOP)$ ..... (1)

In its mathematical form, the model is presented as:

$GINI = \beta_o + \beta_1 FID + \beta_2 CPS + \beta_3 BCAR + \beta_4 POP + \beta_5 TOP$ .....(2)

The model when specified in its econometric form becomes:

$GINI=\beta_o+\beta_1 FID+\beta_2 CPS+\beta_3 BCAR+\beta_4 POP+\beta_5 TOP+U_t$ .....(3)

Where:

GINI = Gini coefficient (a proxy for income inequality)
FID= Financial deepening
CPS= Credit to private sector
BCAR = Bank capital to asset ratio
POP= Population growth
TOP = Trade openness
β_o= Intercept or constant term
β_1-β_5= Parameters to be estimated. They measure the effect of the independent variables on the dependent variables.
U_t= Stochastic term. This takes care of other variables not computed in the model.

Variables in the Model

The model for this study is made up of the regressand and regressors.

Gini coefficient: The Gini coefficient is a measure of income inequality within a population. It quantifies the extent to which the distribution of income or wealth among individuals or households deviates from perfect equality. The Gini coefficient is a number between 0 and 1, where 0 represents perfect equality (all individuals have the same income) and 1 represents maximum inequality (one individual has all the income, while others have none). The a priori expectation is a positive relationship betweenincome inequality (proxy by Gini coefficient) and the independent variables.

The regressors include:

Financial deepening: Financial deepening refers to the process of expanding and strengthening the financial sector of an economy. It involves increasing the range, quality, and accessibility of financial services and products, as well as improving the efficiency and stability of financial institutions and markets. It can be calculated using the ratio of broad money supply (M2) to GDP. The a priori expectation is a negative relationship between financial deepening and income inequality.

Credit to the private sector: Credit to the private sector refers to the amount of lending and financial resources provided by banks, financial institutions, and other lenders to individuals, businesses, and non-governmental organizations within the private sector of an economy. It represents the total value of loans, credit lines, and other forms of credit extended to private entities. It is calculated by summing the total amount of loans and credit extended to private businesses and individuals by banks and other financial institutions within a specific jurisdiction or country. The a priori expectation is a negative relationship between credit to the private sector and income inequality.

Bank capital to asset ratio: The bank capital to asset ratio, also known as the capital adequacy ratio, is a financial metric used to assess a bank's capital strength and its ability to absorb potential losses. It is calculated by dividing a bank's capital by its total assets, and it is usually expressed as a percentage. The a priori expectation is a negative relationship between bank capital to asset ratio policy rate and income inequality.

Population growth: Population growth refers to the increase in the number of individuals in a

particular population over a specific period. It is typically measured as the difference between the number of births and the number of deaths in a population, known as natural population growth. The a priori expectation is a positive relationship between population growth and income inequality.

Trade openness: Trade openness refers to the degree to which a country engages in international trade and economic integration with other nations. It is often measured by indicators the ratio of trade (exports plus imports) to GDP.The a priori expectation is a negative relationship between trade openness and income inequality.

Method of Evaluation Technique

The study employs the econometric technique such as unit root test, cointegration test, error correction model, normality test, Granger causality test and ordinary least square technique.

Evaluation Based on Economic Criteria (A'priori Expectation)

On apriori, $\beta_1<0,\beta_2<0,\beta_3<0,\beta_4>0,\beta_5<0$.

Summary of A'priori Expectation (Economic criteria)

Variables	Expectation Sign	Explanation
GINI	Positive (+)	All other variables in the model affect GINI
FID	Positive (-)	An increase in FID will lead to a decrease in GINI
CPS	Negative (-)	An increase in CPS will lead to a decrease in GINI
BCAR	Negative (-)	An increase in INF will lead to a decrease in RGDP
POP	Positive (+)	An increase in POP will lead to an increase in GINI
TOP	Negative (-)	An increase in TOP will lead to a decrease in GINI

Various Test of Significance

3.5.2(a) Statistical criteria

(i) R^2 Square test(ii) Student t-test (iii) F-test (iv) P-value test (v) DW-test

3.5.2(b) Econometrics Criteria

(i) Unit root test (ii) ADF-test (iii) Cointegration test (iv) normality test (v) Granger Causality test

4.0 Data Analysis and Result

Results and Discussion

Descriptive Statistics.

The table below shows the median, maximum, and maximum standard deviation, skewness, kurtosis, and Jaque-Bera test for the normality of the Model variables. The mean values simply tell us the average value of each of the variables. The descriptive statistics result above presents the mean of the Gini coefficient (GINI),financial deepening (FID), credit to the private sector (CPS), bank capital to asset ratio (BCAR), population growth (POP), and trade openness (TOP) as 41.37087, 17.93508, 10.27539, 4.449377, 2.604159, and36.16016 respectively. The media values tell the middle value of each of the variables. The Median variable taken from the highest to the lowest value falls betweencredit to the private sector (CPS) and financial deepening (FID) with values of 9.395146 and 15.84434 respectively.

Trade openness (TOP) takes the maximum value of 53.27796, while the bank capital to asset ratio (BCAR) has the minimum mean value of 0.000000from the given observation. The standard deviation shows that the degree of variability of Gini coefficient (GINI), financial deepening (FID), credit to the private sector (CPS), bank capital to asset ratio (BCAR),

population growth (POP), and trade openness (TOP), is lower than their various mean. This implies that the series is more spread out.

The skewness results below show that financial deepening (FID), credit to the private sector (CPS), bank capital to asset ratio (BCAR), and trade openness (TOP)are positively skewed. This implies that the distribution has a long right tail and mean, and median values are greater than the mode for each variable.The Gini coefficient (GINI) and population growth (POP) are negatively skewed, implying that the distribution has a long left tail and mean and median values are less than the mode for each variables. The Kurtosis of Gini coefficient (GINI), financial deepening (FID), bank capital to asset ratio (BCAR), population growth (POP), and trade openness (TOP) is greater than 3 which implies that the distribution is assumed to be peaked (leptokurtic) relative to normal while credit to the private sector (CPS) are less than 3 (platykurtic), suggesting that their distributions were flat relative to a normal distribution. The Jarque−Bera statistics show that the series is normally distributed since the p-values of all the series are not statistically significant at the 5% level. Thus, informing the acceptance of the null hypothesis that says each variable is normally distributed.

Table 4.1.1: Summary Descriptive Statistics

	GINI	FID	CPS	BCAR	POP	TOP
Mean	41.37087	17.93508	10.27539	4.449377	2.604159	36.16016
Median	41.55000	15.84434	9.395146	0.000000	2.588849	36.54016
Maximum	42.80000	27.37879	19.62560	17.95485	2.764062	53.27796
Minimum	39.52432	9.063329	4.957522	0.000000	2.406363	16.35219
Std. Dev.	1.150126	6.071568	3.540875	5.566909	0.100915	9.393959
Skewness	-0.287230	0.082702	0.820455	0.807210	-0.084493	-0.157258
Kurtosis	1.597155	1.374326	3.349267	2.364727	1.837692	2.465263
Jarque-Bera	3.063970	3.560233	3.752763	4.013231	1.839355	0.513151
Probability	0.216106	0.168619	0.153143	0.134443	0.398648	0.773696
Sum	1323.868	573.9225	328.8123	142.3801	83.33308	1157.125
Sum Sq. Dev.	41.00651	1142.782	388.6716	960.7048	0.315697	2735.641
Observations	32	32	32	32	32	32

Source: Authors computation (2023).

4.1.2. Test for Stationarity

The Augmented Dickey-Fuller (ADF) unit root test was performed to ascertain the order of integration. The results of the stationarity test are presented in Table 4.2.2.

Table: 4.1.2: Stationarity Test Results.

Variables	Order of Integration	Critical Values			ADF Statistics	Prob.
		1%	5%	10%		
Δ (GINI)	I (1)	-3.670170	-2.963972	-2.621007	-3.048522	0.0417
Δ(FID)	I (1)	-3.670170	-2.963972	-2.621007	-4.486711	0.0013
Δ (CPS)	I (1)	-3.689194	-2.971853	-2.625121	-5.056574	0.0003
Δ (BCAR)	I (1)	-3.679322	-2.967767	-2.622989	-7.810908	0.0000
Δ (POP)	I (1)	-3.711457	-2.981038	-2.629906	-4.148610	0.6804
Δ (TOP)	I (1)	-3.679322	-2.967767	-2.622989	-5.422172	0.0001

Source: Author's computation (2023).

Note:

•Δ = Difference operator

• I(d) = Numbers of times of integration.

• Levels= 10%, 5%, 1% levels of significance

The table above, reveals that all the series are stationary; hence has no unit root. Model estimation relating to time series data that are not stationary is sure to produce unreliable regression results. Gini coefficient (GINI), financial deepening (FID), credit to the private sector (CPS), bank capital to asset ratio (BCAR), population growth (POP), and trade openness (TOP) were stationary at the first difference at a 5% significance level. As can be seen, the probability values are less than 0.05 for each of the variables tested. The unit root test result shows that the order of integration of the variables comprises 1(1), as such the most appropriate model to be adopted in analyzing data remains the Ordinary Least Square (OLS) Model and the appropriate co-integration method to be adopted is Johanssen co-integration method.

JOHANSEN CO-INTEGRATION TEST

Under the Johansen Co-integration test, Co-integration is said to exist if the values of computed Eigen values are significantly different from zero or if the trace statistics is greater than the critical value at 5 percent level of significance. The results of the co-integration in table 4.2.3 below above indicated a co-integrating equation. This is because trace statistics is greater than the critical value at 5 percent level of significance in three of the hypothesized equations.

Table 4.1.3JOHANSEN CO-INTEGRATION TEST RESULTS

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.779272	131.0105	95.75366	0.0000
At most 1 *	0.670882	85.68578	69.81889	0.0016
At most 2 *	0.565371	52.34561	47.85613	0.0178
At most 3	0.411090	27.34776	29.79707	0.0934
At most 4	0.310224	11.46332	15.49471	0.1845
At most 5	0.010665	0.321679	3.841466	0.5706
Trace test indicates 3 cointegratingeqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Source: Authors computation (2023).

4.1.4.OLS ESTIMATES

Table: 4.1.4: **OLS ESTIMATES RESULTS**

Dependent Variable: GINI
Method: Least Squares
Date: 09/23/23 Time: 21:45
Sample: 1990 2021
Included observations: 32

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FID	-0.163364	0.033963	-4.810009	0.0001
CPS	0.034482	0.050977	0.676419	0.5047
BCAR	-0.018142	0.030298	-0.598790	0.5545
POP	0.465796	1.245855	0.373877	0.7115
TOP	0.012486	0.013634	0.915839	0.3682
C	42.36270	2.994967	14.14463	0.0000

R-squared	0.812255	Mean dependent var	41.37087
Adjusted R-squared	0.776150	S.D. dependent var	1.150126
S.E. of regression	0.544156	Akaike info criterion	1.788200
Sum squared resid	7.698757	Schwarz criterion	2.063025
Log likelihood	-22.61120	Hannan-Quinn criter.	1.879297

F-statistic	22.49718	Durbin-Watson stat	2.711495
Prob(F-statistic)	0.000000		

Source: Author's computation (2023).

The obtained R-squared and Adjusted R-squared values, 0.812255 and 0.776150 respectively, indicate that the explanatory variables collectively account for over 81% and 77% of the variability observed in the dependent variable. Furthermore, the F-Statistics p-value, which is less than 5% (specifically 0.000000< 0.05), signifies the statistical significance of the F-Statistics. Consequently, the null hypothesis is rejected, affirming that the explanatory variables jointly exert a significant influence on the dependent variable, income inequality. In addition, the Durbin-Watson statistic, with a value of 2.711495, suggests the absence of autocorrelation, as this falls within the acceptable range for applied research without autocorrelation.

Upon examination of Table 4.1.3b, it becomes evident that the estimates of the value of financial deepening, represented as FID, is statistically significant at a 5% level of significance because its probability value of 0.0001 is less than 0.05. The estimate exhibitsa negative coefficient of 0.163364with income inequality during the evaluation period. This implies that a percentage increase in financial deepening will bring about a 16.3364 percent decrease in income inequality in Nigeria during the evaluation period. Likewise, credit to the private sector (CPS) returns a positive sign of 0.034482 and it exhibits an insignificant relationship with inequality as its probability value of 0.5047 is greater than a 5% level of significance. These results imply that a percentage increase in credit to the private sector (CPS) will lead to a 3.4482 percent increase in income inequality in Nigeria. Bank capital to asset ratio (BCAR) returns a negative sign of 0.018142 and it is statistically insignificant with income inequality in Nigeria. These results imply that a percentage increase in the Bank capital-to-asset ratio (BCAR) will lead to a reduction in income inequality by 1.8142 percent in Nigeria.

Furthermore, population growth (POP) returns a positive sign of 0.465796 and is statistically insignificant to income inequality in Nigeria. These results imply that a percentage increase in population growth (POP) will lead to a 46.5796 percent increase in income inequality in Nigeria. Lastly, the estimates of trade openness (TOP) show that trade openness returns a positive value of 0.012486 and is statistically insignificant with income inequality. This implies that a percentage increase in trade openness will lead to a 1.2486 percent increase in income inequality in Nigeria.

b: Error Correction Result

Dependent Variable: D(GINI)
Method: Least Squares
Date: 09/23/23 Time: 22:57
Sample (adjusted): 1991 2021
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(FID)	-0.001801	0.011071	-0.162716	0.8721
D(CPS)	0.006273	0.011676	0.537253	0.5960
D(BCAR)	0.001342	0.005043	0.266116	0.7924
D(POP)	-0.510220	0.564632	-0.903633	0.3752
D(TOP)	0.000539	0.002110	0.255708	0.8004
ECM(-1)	-0.077654	0.044932	1.728250	0.0468
C	-0.098852	0.018998	-5.203362	0.0000

R-squared	0.169841	Mean dependent var	-0.092764
Adjusted R-squared	-0.037698	S.D. dependent var	0.098204
S.E. of regression	0.100038	Akaike info criterion	-1.570857

Sum squared resid	0.240182	Schwarz criterion	-1.247053
Log likelihood	31.34828	Hannan-Quinn criter.	-1.465305
F-statistic	0.818356	Durbin-Watson stat	1.231331
Prob(F-statistic)	0.566542		

Source: Author's computation (2023).

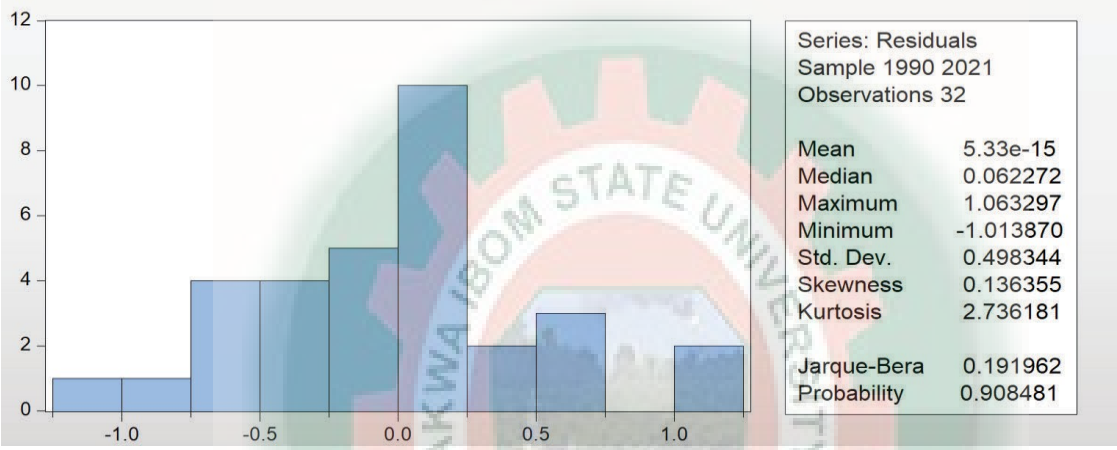
ECM: The sign of the short-run dynamic interactions is consistent with that of the long-run relationship. The estimated error correction coefficient of -0.077654(0.0468) is significant, has the correct sign, and implies a very low speed of adjustment to equilibrium after a shock. Over 7% of disequilibria from the previous year's shock converge back to the long-run equilibrium in the current year.

4.1.5. Diagnostic Tests

4.1.5a Normality Test

The models are examined for normal distribution. The Jarque-Bera (JB) statistics is used to test for the normality of the models. The null hypothesis is that the models are normally distributed. The decision rule is to reject the null hypothesis if the p-value is less than 0.05 level of significance.

Figure 4.1.5a: Normality test of the models of the study



Source: Author's computation (2023).

In the figure above, the Jaque-Bera statistics are used to test for the normality of the model. The Jaque-Bera p-value of 0.908481 is greater than 0.05, thus, there is a normal distribution. That is, the study, therefore, accepts the null hypothesis that the model is normally distributed.

b. Stability Test

To determine the stability of the model, CUSUM and CUSUM of squares were used. The estimated model is stable if its recursive residuals lie within the two critical bounds. On the other hand, if residuals fall outside the two critical lines the model is said to be unstable. The results of the stability test are presented in Figures 2a and 2b. The analysis in Figures 2a and 2b indicates the graph of CUSUM was unstable because the recursive residuals fall outside the critical line while that of CUSUM of squares was stable, meaning that they are all within the 5 % critical bounds. This result implies that the estimated parameters for the study are both stable and unstable for the period under investigation.

Figure 4.1.5b1: Plot of Cumulative Sum of Recursive Residuals
Figure-4.1.5b2. CUSUM of squares test
CUSUM OF SQUARES

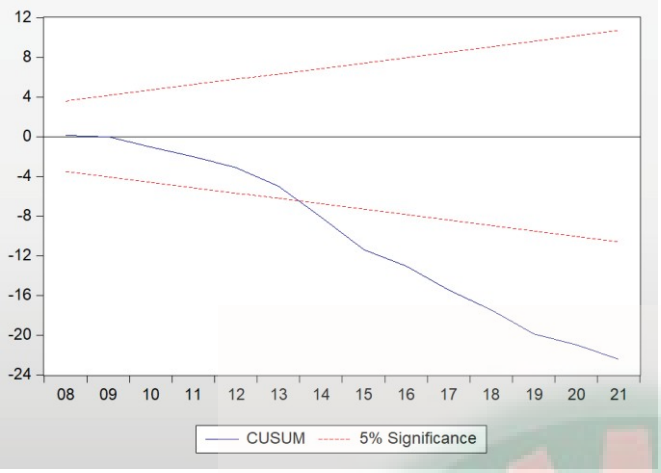
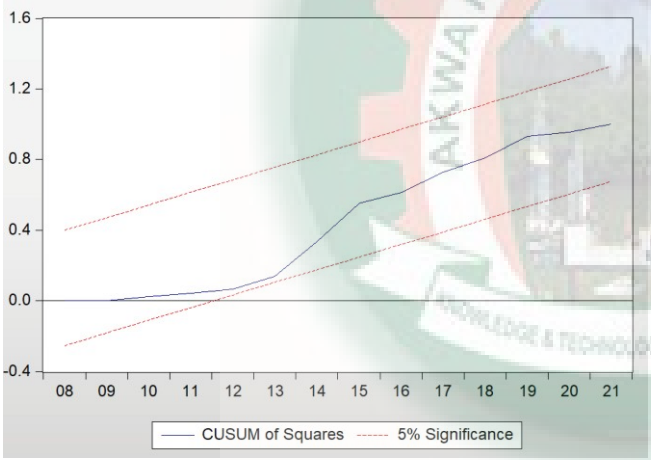


Figure-4.2b. CUSUM of squares test

The straight
CUSUM RESULT



4.1.5.5. Granger Causality

Cointegration between two variables does not specify the direction of a causal relation, if any, between the variables. Economic theory guarantees that there is always Granger Causality in at least one direction Order, D. and L. Fisher, (1993). Before the Granger causality test, we assume that the variables are stationary, and the residuals are uncorrelated. To examine the hypothesis of the Granger causality test, the probability values of the F-statistics are appointed. We accept the null hypothesis if the P-value is greater than 5% otherwise reject Ho. Hence, this aspect of the work seeks to verify the direction of Granger Causality between monetary policy and investment. Estimation results for Granger causality between the very variables are presented below:

CAUSALITY TEST RESULTS

Pairwise Granger Causality Tests
Date: 09/23/23 Time: 21:25
Sample: 1990 2021
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
FID does not Granger Cause GINI	30	0.13600	0.8735
GINI does not Granger Cause FID		5.19272	0.0130
CPS does not Granger Cause GINI	30	1.16148	0.3293
GINI does not Granger Cause CPS		2.96707	0.0698
BCAR does not Granger Cause GINI	30	0.01617	0.9840
GINI does not Granger Cause BCAR		5.42299	0.0111
POP does not Granger Cause GINI	30	1.97549	0.1598
GINI does not Granger Cause POP		3.44075	0.0479
TOP does not Granger Cause GINI	30	1.69794	0.2035
GINI does not Granger Cause TOP		5.38906	0.0113
CPS does not Granger Cause FID	30	0.34183	0.7137
FID does not Granger Cause CPS		2.01898	0.1539
BCAR does not Granger Cause FID	30	3.56029	0.0436
FID does not Granger Cause BCAR		2.59256	0.0948
POP does not Granger Cause FID	30	0.76200	0.4773
FID does not Granger Cause POP		4.28141	0.0252
TOP does not Granger Cause FID	30	0.62031	0.5458
FID does not Granger Cause TOP		1.39282	0.2670
BCAR does not Granger Cause CPS	30	8.97777	0.0012
CPS does not Granger Cause BCAR		2.77428	0.0816
POP does not Granger Cause CPS	30	1.05902	0.3618
CPS does not Granger Cause POP		0.71808	0.4975
TOP does not Granger Cause CPS	30	0.00335	0.9967
CPS does not Granger Cause TOP		0.89206	0.4225
POP does not Granger Cause BCAR	30	1.05273	0.3639
BCAR does not Granger Cause POP		0.75951	0.4784
TOP does not Granger Cause BCAR	30	0.30035	0.7432
BCAR does not Granger Cause TOP		1.71620	0.2003
TOP does not Granger Cause POP	30	0.63976	0.5358
POP does not Granger Cause TOP		3.53749	0.0444

Source: Author's computation (2023).

From the table above, it was also observed that Gini coefficient (GINI) has uni-directional causationwith financial deepening (FID), bank capital to asset ratio (BCAR), population growth (POP), and trade openness (TOP) as their probability values is less 5% level of significance.

Summary of Major Findings

The Study examined the impact of financial development and income inequality in Nigeria. The explanatory variables are financial deepening (FID), credit to the private sector (CPS), bank capital to asset ratio (BCAR), population growth (POP), and trade openness (TOP) in Nigeria between the periods of 1990 through 2021(31 years) while the dependent variable is the Gini coefficient (GINI) proxy for financial development. The study adopted an ex-post facto research design and used secondary data obtained from the CBN Statistical Bulletin. The data were subjected to the Augmented Dickey Fuller stationarity test to determine the best suitable econometric tool for analyses. The Autoregressive Distributive Lag (ARDL) was used for the model estimation.

Conclusion

The OLS results of the analysis show that financial deepening (FID) and bank capital to asset ratio (BCAR) have a negative relationship with income inequality in Nigeria with financial deepening having a significant relationship with income inequality; and bank capital to asset ratio have an insignificant relationship with inequality. The results also show that Credit to the private sector (CPS), population growth (POP), and trade openness (TOP)maintain a positive and insignificant relationship with income inequality in Nigeria. The test of hypothesis shows that bank capital to asset ratio (BCAR) and Credit to the private sector (CPS) have an insignificant relationship with income inequality while financial deepening (FID) has a significant relationship with income inequality in Nigeria. Therefore, it is necessary for policymakers and government to promote financial development in Nigeria so as to bail the economy out of rising income inequality.

Recommendations

From data analysis and findings, the study makes the following recommendations:

1. In light of the discernible inverse correlation between financial deepening and income inequality, it is imperative that policymakers accord precedence to endeavors aimed at fostering financial inclusivity and expanding access to financial services across all demographic strata.

2. Despite the insignificance of the relationship between BCAR (Bank Capital Adequacy Ratio) and income inequality, it remains incumbent upon the government to uphold the stability of the banking sector. Strengthening the framework of banking regulation and supervision holds the potential to uphold a robust financial system, thereby contributing to both economic stability and the mitigation of income inequality.

3. It is advisable for the government to actively endorse judicious lending practices within financial institutions. This encompasses the implementation of regulations designed to counteract predatory lending practices, the assurance of equitable interest rates, and the fostering of transparency in financial transactions.

4. Given the statistically insignificant connection between CPS (Credit to Private Sector) and income inequality, policymakers can channel their efforts towards directing credit towards sectors that exhibit the potential to engender employment opportunities and ameliorate income disparities. This could be realized through the institution of targeted lending programs and incentives tailored for enterprises operating within such sectors.

5. In light of the positive yet statistically insignificant correlation between population growth and income inequality, the government ought to deliberate on policies that tackle

the challenges associated with demographic expansion, encompassing measures such as ensuring access to quality education and family planning services. Education, in particular, assumes a pivotal role in the long-term reduction of income inequality.

6. Although trade openness was found to exhibit a positive yet statistically insignificant link with income inequality, it behooves the government to adopt trade policies that prioritize inclusivity. This entails ensuring that the benefits of trade are equitably distributed across various segments of the population and offering support to industries that hold the potential to ameliorate income inequality.

7. Policymakers should institute a rigorous system for the systematic monitoring and evaluation of the efficacy of bank services.

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APPENDIX A

4.1 Data presentation

Table 4.1

YEAR	GINI	CPS	BCAR	FID	TOP	POP
1990	42.4	4.95752	0	11.6354	30.9247	2.628598955
1991	42.5	5.2411	0	13.3999	37.0216	2.562201236
1992	42.6	8.23451	0	14.2474	38.2274	2.523727963
1993	42.7	7.00772	0	15.7877	33.7198	2.555767624
1994	42.7	8.03729	0	15.0919	23.0592	2.574829449
1995	42.8	6.50871	0	10.2819	39.5284	2.557189798
1996	42.8	6.17444	0	9.06333	40.2577	2.526852594
1997	42.7	7.03059	0	9.72527	51.461	2.522964745
1998	42.6	7.61945	0	10.939	39.2786	2.516033896
1999	42.4	8.16881	0	12.7634	34.4578	2.542619887
2000	42.3	8.24899	0	14.6696	48.9956	2.60286877
2001	42.1	9.88081	0	15.901	49.6805	2.651265494
2002	42	8.08434	0	13.527	40.0352	2.682889956
2003	41.9	8.90948	0	13.0266	49.335	2.692767906
2004	41.8	8.46166	0	11.7588	31.8959	2.695503465

2005	41.6	8.4351	0	11.3005	33.0595	2.693693418
2006	41.5	8.12036	0	11.729	42.5666	2.695925823
2007	41.4	13.797	15.6635	19.2911	39.3369	2.709626937
2008	41.2	18.633	17.9549	23.8119	40.7968	2.719686803
2009	41.1	19.6256	4.07968	25.1442	36.0587	2.727384843
2010	40.9	13.4907	1.49041	21.3558	43.3208	2.744378852
2011	40.7	11.0436	10.6178	22.479	53.278	2.764062379
2012	40.5	10.6047	10.8206	24.9282	44.5324	2.749288878
2013	40.3	11.5332	10.3923	25.448	31.0489	2.697474043
2014	40.2	13.297	10.429	22.6896	30.8852	2.628123853
2015	40	13.0787	12.3757	22.3668	21.3327	2.541187462
2016	39.9	14.608	11.3717	27.3788	20.7225	2.507034086
2017	39.8	12.852	6.84371	24.7814	26.3476	2.52731692
2018	39.7	10.2466	8.48837	25.3625	33.0078	2.496644904
2019	39.6	11.1576	7.76912	23.9296	34.0239	2.448200698
2020	39.6434	12.1319	6.77537	25.2216	16.3522	2.440608885
2021	39.5243	13.5918	7.30791	24.8862	22.5765	2.406363381

Source: World Development Indicators(2021)

APPENDIX B 1

UNIT ROOT

GINI @ 1ST DIFFERENCE

Null Hypothesis: D(GINI) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.048522	0.0417
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GINI,2)
Method: Least Squares
Date: 09/23/23 Time: 20:10
Sample (adjusted): 1992 2021
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GINI(-1))	-0.421147	0.138148	-3.048522	0.0050
C	-0.046001	0.018567	-2.477615	0.0195

R-squared	0.249199	Mean dependent var	-0.007304
Adjusted R-squared	0.222384	S.D. dependent var	0.084161

S.E. of regression	0.074215	Akaike info criterion	-2.299352
Sum squared resid	0.154222	Schwarz criterion	-2.205939
Log likelihood	36.49028	Hannan-Quinn criter.	-2.269468
F-statistic	9.293484	Durbin-Watson stat	2.585305
Prob(F-statistic)	0.004980		

APPENDIX B2
FID @ 1ST DIFFERENCE

Null Hypothesis: D(FID) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.486711	0.0013
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FID,2)
Method: Least Squares
Date: 09/23/23 Time: 20:12
Sample (adjusted): 1992 2021
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(FID(-1))	-0.833178	0.185699	-4.486711	0.0001
C	0.307327	0.472840	0.649960	0.5210

R-squared	0.418249	Mean dependent var	-0.069998
Adjusted R-squared	0.397472	S.D. dependent var	3.283270
S.E. of regression	2.548562	Akaike info criterion	4.773276
Sum squared resid	181.8646	Schwarz criterion	4.866689
Log likelihood	-69.59914	Hannan-Quinn criter.	4.803159
F-statistic	20.13057	Durbin-Watson stat	1.919647
Prob(F-statistic)	0.000113		

APPENDIX B 3
CPS @ 1ST DIFFERENCE

Null Hypothesis: D(CPS) has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.056574	0.0003
Test critical values:	1% level	-3.689194	
	5% level	-2.971853	
	10% level	-2.625121	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CPS,2)
Method: Least Squares

Date: 09/23/23 Time: 20:15
Sample (adjusted): 1994 2021
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CPS(-1))	-1.378890	0.272693	-5.056574	0.0000
D(CPS(-1),2)	0.588470	0.208436	2.823266	0.0094
D(CPS(-2),2)	0.442706	0.173399	2.553111	0.0175
C	0.320399	0.364565	0.878853	0.3882

R-squared	0.540216	Mean dependent var	0.095955
Adjusted R-squared	0.482743	S.D. dependent var	2.659069
S.E. of regression	1.912418	Akaike info criterion	4.266178
Sum squared resid	87.77624	Schwarz criterion	4.456493
Log likelihood	-55.72649	Hannan-Quinn criter.	4.324359
F-statistic	9.399473	Durbin-Watson stat	1.979160
Prob(F-statistic)	0.000273		

APPENDIX B 4

BCAR @ 1ST DIFFERENCE

Null Hypothesis: D(BCAR) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.810908	0.0000
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(BCAR,2)
Method: Least Squares
Date: 09/23/23 Time: 20:17
Sample (adjusted): 1993 2021
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(BCAR(-1))	-1.623242	0.207817	-7.810908	0.0000
D(BCAR(-1),2)	0.655142	0.148521	4.411121	0.0002
C	0.420057	0.654495	0.641804	0.5266

R-squared	0.708589	Mean dependent var	0.018364
Adjusted R-squared	0.686172	S.D. dependent var	6.271499
S.E. of regression	3.513314	Akaike info criterion	5.448694
Sum squared resid	320.9278	Schwarz criterion	5.590138
Log likelihood	-76.00606	Hannan-Quinn criter.	5.492993
F-statistic	31.61046	Durbin-Watson stat	1.979934
Prob(F-statistic)	0.000000		

APPENDIX B 5

POP @ 1ST DIFFERENCE

Null Hypothesis: D(POP) has a unit root
Exogenous: Constant
Lag Length: 4 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.148610	0.6804
Test critical values:	1% level	-3.711457	
	5% level	-2.981038	
	10% level	-2.629906	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(POP,2)
Method: Least Squares
Date: 09/23/23 Time: 20:21
Sample (adjusted): 1996 2021
Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(POP(-1))	-0.231398	0.201459	-1.148610	0.2643
D(POP(-1),2)	0.416022	0.231519	1.796927	0.0875
D(POP(-2),2)	-0.547473	0.261911	-2.090300	0.0496
D(POP(-3),2)	0.338625	0.201979	1.676538	0.1092
D(POP(-4),2)	-0.371819	0.207737	-1.789850	0.0886
C	-0.001963	0.004696	-0.418118	0.6803

R-squared	0.409501	Mean dependent var	-0.000639
Adjusted R-squared	0.261876	S.D. dependent var	0.027247
S.E. of regression	0.023409	Akaike info criterion	-4.472225
Sum squared resid	0.010960	Schwarz criterion	-4.181896
Log likelihood	64.13893	Hannan-Quinn criter.	-4.388621
F-statistic	2.773927	Durbin-Watson stat	2.003273
Prob(F-statistic)	0.046283		

APPENDIX B 6

TOP @ 1ST DIFFERENCE

Null Hypothesis: D(TOP) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.422172	0.0001
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TOP,2)
Method: Least Squares
Date: 09/23/23 Time: 20:28
Sample (adjusted): 1993 2021
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TOP(-1))	-1.617126	0.298243	-5.422172	0.0000
D(TOP(-1),2)	0.316260	0.198125	1.596263	0.1225
C	-0.720325	1.674145	-0.430265	0.6705

R-squared	0.650568	Mean dependent var	0.173054
Adjusted R-squared	0.623688	S.D. dependent var	14.65172
S.E. of regression	8.987993	Akaike info criterion	7.327353
Sum squared resid	2100.384	Schwarz criterion	7.468798
Log likelihood	-103.2466	Hannan-Quinn criter.	7.371652
F-statistic	24.20318	Durbin-Watson stat	2.099357
Prob(F-statistic)	0.000001		