Financial inclusion and economic growth in Nigeria: Further Evidence from ARDL Model

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Abstract
The paper examines the effect of financial inclusion on Nigeria's economic growth, using annual time series data from 1980 to 2019 by employing an autoregressive distributive lag method (ARDL). The paper finds that a long-run relationship exists among Real gross domestic product, Human capital development index (HDI), investment (INV), inflation rate (INF), nominal exchange rate (EXR), and financial inclusion index (FIN) and that 26 per cent of short-run deviation of economic growth rate from its long-run path is corrected within a year disequilibrium in the short run is corrected each year. The study found that financial inclusion, human capital, and Investment have a significant positive impact on economic growth in the short and long-run, while the exchange rate positively and significantly impacts economic growth in the long run and negatively in the short run, respectively. However, inflation had a negative and significant impact on economic growth in the long run. An insignificant impact in the short run. Financial inclusion had the largest has the most impact on economic growth, contributing 11.5 per cent to Nigeria's economic growth. The paper, therefore, recommends that government should intensify efforts to increase the rate of financial inclusion in the country, the financial institutions should remove unnecessary bureaucracy and institutional restrictions on access to finances, while the government needs to ensure a stable price level for consumer and investment goods and ensure stable local currency in order to provide an appropriate economic signal to local and foreign investors who may want to invest in the country.

Key Word: Financial Inclusion, Broad access Index, Economic growth
JEL Code: G21, O16, O50

1.0 Introduction

Finance is a major catalyst for economic growth and development globally. The financial system is the vehicle used to mobilize, harness, and efficiently utilize resources in the most profitable way possible. For instance, World Bank (2012) defines financial inclusion as the range, quality, and availability of financial services to the underserved and financially excluded. They also posit that financial inclusion means individuals and businesses can access valuable and affordable financial products and services that meet their needs. Such transactions, payments, savings, credit, remittances, and insurance are delivered responsibly and sustainably. According to Consultative Group Assist the Poor (CGAP)'s report in 2011, financial inclusion means that formal financial services such as deposit and savings accounts, payment services, loans, and insurance are readily available to consumers. Furthermore, they are actively and effectively using these services to meet their specific needs.

Nigeria, in October 2012, launched the National Financial Inclusion Strategy (NFIS). The strategy aimed to reduce the number of adult Nigerians who are hitherto excluded from formal financial services from 46% to 20% in 2020. This will consequently increase the overall number of financially included to 80% by 2020. Despite implementing this strategy for more than seven years, the participation of Nigerians in the formal financial system is abysmally low at 33.8%,

while 15.0% used the informal financial system to meet their financial need, when compared to other countries such as South Africa and Namibia at 80% and 68% respectively (EFInA, 2018).

According to the Enhance financial inclusion and access (EFInA) 2018 survey, the financially excluded populations in Nigeria stood at 36.8%, translating to 36.6 million adult Nigerians excluded from the formal financial system, out of which 44.1 % are male while 55.9% are female. Furthermore, the banked adult population makes up 39.7% of the population; of this, 9.0% are in the formal sector of the economy, while 14.6% are found in the informal sector of the economy (EFInA, 2018). These statistics present significant opportunities for the country to rapidly increase its economic growth by increasing the number of people with access to finance in the formal financial system. For instance, economic growth could be achieved faster if all population segments had unfettered access to financial services (Sanusi, 2010). Digital financial inclusion could provide the potential impetus for economic benefit for Nigeria by boosting GDP in the region by about 12% by 2025, as well as mobilizing new savings to the tune of USD 36 million; creating about 3 million new jobs; reducing government leakages annually by USD 2 billion, and add about 46 million people to the inclusion bracket (Mckinsey Global Institute, 2016).

The present statistics show that many Nigerians are economically and socially excluded from the nation's economic activities, which explains why the level of poverty is so high in the country. Thus, the level of poverty could be related to the level of exclusivity in the economy. Financial inclusion is critical to the attainment of poverty reduction removal of barriers to economic participation of rural dwellers, women, youths, and those at the bottom of the poverty pyramid (Nwankwo and Nwankwo, 2014). In order to ensure meaningfully, sustained, and inclusive growth, the number of the financially excluded population must be brought into the formal financial sector; this would rapidly increase the tax base of the country, as well as ultimately increase tax revenue and invariably solve some of the socio-economic ills plaguing Nigeria, such as resolving social amenities inadequacy which may help to stem crimes rate among the socially deprived or socially excluded population in the country.

Financial inclusion has been recognized as the catalyst for economic growth (Claessens & Perotti, 2007; Claessens, 2006). Financial inclusion enhances the efficiency of intermediation, increases savings mobilization by the financial sector, and enhances entrepreneurial activities, eventually leading to economic growth (Hariharan & Marktanner, 2012; Andrianaivo & Kpodar (2012). Similarly, Khan (2011) explains that financial access increases employment opportunities for rural households. As more rural populations participate in economic activities, the disposable income of the rural dwellers would rise. It will lead to more savings and deposit mobilization, which will result in economic growth through the multiplier effect.

There has been growing interest in the empirical investigation of the relationship between financial inclusion and economic growth (Van et al., 2019; Mwaitete & George, 2018; Gretta, 2017; Iqbal & Sami, 2017; Saidi & Emara, 2017; Okoyo et al., 2017; Lenka & Sharma, 2017; Sharma, 2016; Nkwede, 2015; Onaolapo, 2015; Michael & Sharon, 2014; Wang'oo, 2013; Oreo, 2013; Bruce, Gine, Goldberg, & Yang, 2013; Hariharan & Marktanner, 2012; Andrianaivo & Kpodar, 2012; Swamy, 2012). For instance, these authors found that financial inclusion catalyzes economic growth, supply leading hypothesis (Lenka & Sharma, 2017; Uchenna & Anyanwaokoro, 2017**;** Okoye et al., 2017; Iqbal & Sami, 2017; Sharma, 2016**)**. Also, some studies found economic

growth drives financial inclusion; the demand-following hypothesis, see (Evans, 2015 and Babajide, Adegboye, & Omankhanlen, 2015), while other studies found bi-directional causality between financial inclusion and economic growth (Erlando, Riyanto & Masakazu, 2020; Chinodam and Kwenda, 2019; Kim, Yu, & Hassan, 2018; Gour'ene and Mendy, 2017). On the contrary, some studies observed no relationship between financial inclusion and economic growth (Otiwu et al., 2018; Gour'ene and Mendy, 2017).

Research is scarce on the subject of financial inclusiveness in Nigeria; for example, the use of commercial bank credit to the private sector as a measure of financial access left out important institutional, as well as policies impediment inhibiting access to finance and commercial bank outstanding loan as per cent of GDP as measures of financial usage, also ignored other services provided by the financial system. This study employed an all-encompassing measure of financial access developed by the International Monetary Fund, where they used component analysis to the developed financial institution and markets access indices using data such as Bank branches (commercial banks) per 100,000 adults, ATMs per 100,000 adults, % of people with a bank account, % of firms with line of credit (all firms), % of firms with the line of credit (small firms), % of stock market capitalization outside of the top 10 largest companies, the total number of issuers of debt (domestic and external, non-financial corporations and financial corporation's per 100,000 adults). These variables and the component analysis method used to drive the indices provide broad-based information on access to finance in society, albeit the narrow measure that accounts for just a part of institutional access while ignoring the market access to correct the inadequacy inherent in previous studies. Hence, the gap this study intends to fill in the literature.

Following the introduction in section 1, the remaining part of the paper is organized into four sections; section 2 is the literature review on financial inclusion, and section 3 presents the methodology. Section 4 presents the empirical analysis and discussion of results, while section 5 shows the conclusion and policy recommendations.

2.0 Literature Review

According to Fadun (2014), financial inclusion could alleviate poverty and enhance income redistribution in a country. Also, access to essential financial services in Nigeria would lead to increased economic activities and employment opportunities for rural dwellers; as more people get engaged in economic activities, the disposable income of the rural dwellers would rise, leading to more savings and a robust deposit base for the bank, the multiplier effect will result in economic growth (Migap et al., 2015). Hariharan and Marktanner (2012) stated that financial inclusion enhanced economic growth and development. They also found a strong positive correlation between a country's financial inclusion and total factor productivity (TFP). They concluded that financial inclusion could increase the financial sector savings portfolio, enhance the efficiency of intermediation, and boost entrepreneurial activities, resulting in economic growth. In the same vein, Sarma and Pais (2010) affirmed the importance of financial inclusion by lowering the prevalence of informal financial institutions that are primarily exploitative, enhancing easy access to capital, and using the formal financial system by all segments of the economy. It also enhances the efficient allocation of productive resources and, in the process, reduces the cost of capital. Mbutor and Uba (2013) examined the impact of financial inclusion on Nigeria's monetary policy

between 1980 and 2012 using a simple model. They found that financial inclusion improves monetary policy effectiveness in Nigeria.

Furthermore, Subbarao (2009) posited that very few economies transit from an agricultural system to a post-industrial modern society without a broad-based financial inclusion strategy, and it enables the governments to make direct payments to the bank account of beneficiaries such as subsidies, credit guarantee funds and wages via electronic transfer channels. It helps minimize transaction costs and leakages and ultimately eradicates corruption from society**.** Olaniyi and Olaniyi (2017) examined the impact of financial inclusion on Nigeria's economic growth using the Granger causality and cointegration test. They found bi-directional causality between financial inclusion and economic growth, and also, there is bi-directional causality between financial inclusion and growth in most sectors of the economy.

Subbarao (2009) stated that financial inclusion is essential for sustainable and equitable growth and an avenue for bringing the poor's savings into the formal financial intermediation system and Investment. Sarma and Pais (2010) found that financial inclusion provides easy access, availability, and usage of the formal financial system to all the segments of an economy and enables efficient allocation of production factors. Moïse and Xu (2018) examined the relationship between financial inclusion and economic growth in Rwanda from 2004 to 2016 using the ARDL method. They found the existence of a long-run relationship between financial inclusion and economic growth in Rwanda. Kim, Yu, and Hassan (2018) posited that financial inclusion positively impacts economic growth. Mandel and Seydl (2016) also affirmed the positive contribution of financial inclusion on financial stability and economic growth. Demirgüc-Kant & Klapper (2012) posited that an inclusive financial system is beneficial to poor people and other disadvantaged groups in society. Wakdok (2018) analyzed the effect of financial inclusion on Nigeria's economic growth, using secondary data from 1990 to 2014. The study employed Cointegration and error correction model. He found that financial inclusion positively and significantly impacted economic growth in Nigeria.

Onaolapo (2015) documents that in the absence of financially inclusive systems, the poor would depend on their inadequate savings for future investments, and micro or small businesses will be unable to implement favourable growth strategies due to dependent on their meagre earnings, which are responsible for the persistent income inequality and hindrance to the economic growth of most developing countries. More so, Kama and Adigun (2013) posited that providing access to hundreds of millions of men and women who are currently excluded from financial services would create a large depository of savings, investable funds, Investment, and, therefore, global wealth generation. Because when low-income earners are given access to financial services, capital accumulation will occur and ultimately lead to a rise in Investment because low-income earners comprise a more significant percentage of developing countries. Mbutor and Uba (2013) believed that expanding financial inclusion would reduce the cost of cash management and defend the local currency's strength while promoting a sound financial system in the economy. Also, Friday (2015) examined the impact of financial inclusion on economic growth in Africa, taking Nigeria as a case study by employing extrapolation of Nigeria's financial inclusion data for the period of 1981-2013. The study found that financial inclusion negatively and significantly impacted Nigeria's economy and, by extension, African economic growth. However, he attributes the negative effect to a high level of financial exclusivity in Africa. This point is further buttressed by the World Bank (2013), which reported that a lot of bankable adult populations in Africa appear to have no access to

financial services and are therefore being excluded financially from the economy. Yetman (2015), studied 130 countries; found aggregate consumption volatility is lower in countries where financial inclusion is high, and Chauvet and Jacolin (2017) examined the effect of financial inclusion, bank concentration, and firm performance for 79 developing and emerging countries. With the use of firm-level data, they found that financial inclusion positively impacted firm growth. Oji (2015) suggested that, for financial inclusion to improve in developing countries, the following restrictions should be removed: minimum upfront deposits required in opening bank accounts, provision of financial institutions in rural environments, and unnecessary bottlenecks and bureaucratic documentation required by banks should be reduced.

Similarly, Nguling'wa et al. (2019) examined the impact of financial inclusion on economic growth. They employed a two-way random effects estimate for 25 Sub-Saharan African countries. They found that financial inclusion has a positive impact on economic growth in these countries. Grakolet and Pierre (2017) examined causal links between financial inclusion and economic growth in the West African Economic and Monetary Union (WAEMU) from 2006 to 2015. They employed the heterogeneity panel causality test with Maximal Overlap Discrete Wavelet Transform (MODWT) to analyze causality for the variant period. The study found at a scale of 1 (2-4 years), there is no causality between economic growth and financial Inclusion indicators, while at a scale of 2 (4-8 years), there was bi-directional causality between economic growth and financial inclusion. Also, Osuala and Okoro (2020) examined the impact of financial inclusion on Sub-Saharan African economies from 1985 to 2017, with an emphasis on Nigeria and Ghana. The study employed a panel autoregressive distributed lag (ARDL) model. They found that financial inclusion has significantly impacted the economies of sub-Saharan Africa.

3.0. Methodology

3.1. Theoretical Framework

The theoretical model used in this study to drive the objective of determining the effect of financial inclusion on economic growth is premised on the neoclassical growth model of Solow(1956). This model posits that the economic growth of a nation is a function of two factors input labour and capital in a given economy.

The model is stated as follows:

$Y = Af(K, L)$ …….(1)

Y is the total output of the economy, L is the quantity of labour used in the production process, K is the quantity of capital used in the production process, and A is the level of technology or total factor productivity (Solow residual). Similarly, Goode (1959) advocated the inclusion of human capital, education, or knowledge in the growth accounting equation. Hence, equation (1) is restated thus:

$Y = Af(K, L, H)$……..(2)

Taking the log of equation (2), we have;

$InY = In\ A + \alpha\ In\ K + \beta\ In\ L + \gamma\ In\ H + \mu$…….(3)

Using equation (3) to drive linear equation, we have;

$Y = \beta_1 + \beta_2 K + \beta_3 L + \beta_4 H + \mu$……(4)

Where β_1, β_2, β_3, β_4 are parameters, which are $\beta_1>1$, $0<\beta_2<1$, $0<\beta_3<1$, $0<\beta_4<1$

$Y = InY$, $\beta_1 = In\ A$, $\beta_2 K = \alpha\ In\ K$, $\beta_3 L = \beta\ In\ L$, $\beta_4 H = \gamma\ In\ H$ and μ= error term.

Equation (4) is augmented to include financial inclusion by decomposing capital K into physical and financial capital (Financial inclusion); thus, equation (4) is written as

$Y = \beta_1 + \beta_2 K + \beta_3 F + \beta_4 L + \beta_4 H + \mu$……..(5)

Where Y is the total output of the economy (economic growth), L is the quantity of labour used in the production process, K is the quantity of capital used in the production process, F is the financial inclusion variable, H is the human capital, and β_1 is the technology or total factor productivity (Solow residual).

3.2. Data Measurement

The data for financial access was collected from the International Monetary Fund financial development index database. However, this data is divided into a financial institutions and financial market access. Financial institution access index compiled data on Bank Branches (commercial banks) per 100,000 adults, ATMs per 100,000 adults, % of people with a bank account, % of firms with a line of credit (all firms), % of firms with the line of credit (small firms). While Financial market access compiled data on % of stock market capitalization outside of the top 10 largest companies, the total number of issuers of debt (domestic and external, non-financial corporations, and financial corporations per 100,000 adults. To ensure we capture both aspects of financial access in the economy, we drive the mean value of the financial institution and financial markets to arrive at the financial inclusion index used in this study.

3.3. Econometric Method of Analysis

This study examines the impact of financial inclusion on economic growth using the autoregressive distributed lag (ARDL) method. The advantages of ARDL includes; the elimination of endogeneity problem and problem associated with hypotheses testing of long-run parameters are removed, simultaneous estimates of long and short-run parameters, it does not require a pretest for unit roots among variables; it can be implemented even if the variable is integrated of a different order, so long as they are order one I(1), I(0) or fractionally integrated and it does not require symmetry lags to implement (Pesaran and Shin 1999; Pesaran et al., 2001).

3.4. Model Specification

We situate the relationship between financial inclusion and economic growth by stating the simple model that economic growth proxied by RGDP as a function of financial inclusion thus;

RGDP=f(FIN) …….(6)

Equation (6) above states that economic growth is a function of financial inclusion alone. In order to avoid overstating the influence of financial inclusion, other growth-enhancing variables were added to equation (6). We express RGDP (USD) as a function of the inflation rate, exchange rate, Human development index, Investment, and financial inclusion index as follows:

RGDP=f(INF, EXR, HDI, INV, FIN)…….(7)

Equation (7) is expressed in explicit econometric form thus;

$$RGDP_t = \beta_1 + \beta_2 INF_t + \beta_3 EXR_t + \beta_4 INV_t + \beta_5 HDI_t + \beta_6 FIN_t + \varepsilon \text{.....(8)}$$

Equation (8) is restated in autoregressive distributed lag form as follows:

$$\Delta RGDP_t = \alpha_0 + \sum_{i=1}^{m} \beta_1 \Delta GDP_{t-i} + \sum_{i=1}^{m} \beta_2 \Delta INF_{t-i} + \sum_{i=1}^{m} \beta_3 \Delta EXR_{t-i} + \sum_{i=1}^{m} \beta_4 \Delta INV_{t-i} + \sum_{i=1}^{m} \beta_4 \Delta HDI_{t-i} + \sum_{i=1}^{m} \beta_5 \Delta FIN_{t-i}$$
$$+\delta_1 RGDP_{t-i} + \delta_2 INF_{t-i} + \delta_3 EXR_{t-i} + \delta_4 INV_{t-i} + \delta_5 HDI_{t-i} + \delta_6 FIN_{t-i} + \varepsilon_t \quad \text{.....9}$$

$$\Delta INF_t = \alpha_0 + \sum_{i=1}^{m} \beta_1 \Delta INF_{t-i} + \sum_{i=1}^{m} \beta_2 \Delta RGDP_{t-i} + \sum_{i=1}^{m} \beta_3 \Delta EXR_{t-i} + \sum_{i=1}^{m} \beta_4 \Delta INV_{t-i} + \sum_{i=1}^{m} \beta_5 \Delta HDI_{t-i} + \sum_{i=1}^{m} \beta_6 \Delta FIN_{t-i}$$
$$+\delta_1 INF_{t-i} + \delta_2 RGDP_{t-i} + \delta_3 EXR_{t-i} + \delta_4 INV_{t-i} + \delta_5 HDI_{t-i} + \delta_6 FIN_{t-i} + \varepsilon_t \quad \text{.....10}$$

$$\Delta EXR_t = \alpha_0 + \sum_{i=1}^{m} \beta_1 \Delta EXR_{t-i} + \sum_{i=1}^{m} \beta_2 \Delta INF_{t-i} + \sum_{i=1}^{m} \beta_3 \Delta RGDP_{t-i} + \sum_{i=1}^{m} \beta_4 \Delta INV_{t-i} + \sum_{i=1}^{m} \beta_5 \Delta HDI_{t-i} + \sum_{i=1}^{m} \beta_6 \Delta FIN_{t-i}$$
$$+\delta_1 EXR_{t-i} + \delta_2 INF_{t-i} + \delta_3 RGDP_{t-i} + \delta_4 INV_{t-i} + \delta_5 HDI_{t-i} + \delta_6 FIN_{t-i} + \varepsilon_t \quad \text{.....11}$$

$$\Delta INV_t = \alpha_0 + \sum_{i=1}^{m} \beta_1 \Delta INV_{t-i} + \sum_{i=1}^{m} \beta_2 \Delta EXR_{t-i} + \sum_{i=1}^{m} \beta_3 \Delta INF_{t-i} + \sum_{i=1}^{m} \beta_4 \Delta RGDP_{t-i} + \sum_{i=1}^{m} \beta_5 \Delta HDI_{t-i} + \sum_{i=1}^{m} \beta_6 \Delta FIN_{t-i}$$
$$+\delta_1 INV_{t-i} + \delta_2 EXR_{t-i} + \delta_3 INF_{t-i} + \delta_4 RGDP_{t-i} + \delta_5 HDI_{t-i} + \delta_6 FIN_{t-i} + \varepsilon_t \quad \text{.....12}$$

$$\Delta HDI_t = \alpha_0 + \sum_{i=1}^{m} \beta_1 \Delta HDI_{t-i} + \sum_{i=1}^{m} \beta_2 \Delta INV_{t-i} + \sum_{i=1}^{m} \beta_3 \Delta EXR_{t-i} + \sum_{i=1}^{m} \beta_4 \Delta INF_{t-i} + \sum_{i=1}^{m} \beta_5 \Delta RGDP_{t-i} + \sum_{i=1}^{m} \beta_6 \Delta FIN_{t-i}$$
$$+\delta_1 HDI_{t-i} + \delta_2 INV_{t-i} + \delta_3 EXR_{t-i} + \delta_4 INF_{t-i} + \delta_5 RGDP_{t-i} + \delta_6 FIN_{t-i} + \varepsilon_t \quad \text{.....13}$$

$$\Delta FIN_t = \alpha_0 + \sum_{i=1}^{m} \beta_1 \Delta FIN_{t-i} + \sum_{i=1}^{m} \beta_2 \Delta HDI_{t-i} + \sum_{i=1}^{m} \beta_3 \Delta INV_{t-i} + \sum_{i=1}^{m} \beta_4 \Delta EXR_{t-i} + \sum_{i=1}^{m} \beta_5 \Delta INF_{t-i} + \sum_{i=1}^{m} \beta_6 \Delta RGDP_{t-i}$$
$$+\delta_1 FIN_{t-i} + \delta_2 INV_{t-i} + \delta_3 EXR_{t-i} + \delta_4 INF_{t-i} + \delta_5 RGDP_{t-i} + \delta_6 HDI_{t-i} + \varepsilon_t \quad \text{.....14}$$

Where: RGDP denotes real gross domestic product (USD), HDI is the Human capital development index, INV is the investment proxied by gross capital formation, INF is the inflation rate, and EXR is the nominal exchange rate of Naira/USD while FIN is financial inclusion index proxied by financial access index.

In equation (9) with RGDP as the dependent variable, the null hypothesis of no cointegration and normalization method for equation (10) to equation (14): $H_0 = \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = \delta_6 = 0$ No level relationship and alternative hypothesis of Cointegration: $H_1 = \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = \delta_6 \neq 0$ Level relationship exists. Decision rule: reject the null hypothesis if the F-statistic value is less than Pesaran tabulated critical lower bound I(0): there is no cointegration and if the F-statistic value is greater than Pesaran tabulated critical upper bound I(1): there is Cointegration, also, if F-statistic value falls within the lower bound I(0) and upper bound I(1): the test is inconclusive.

3.5. Model Justification

The unit root test result showed the variables integrated of a different order and was mostly order one I(1) variables and since no variable is integrated of a higher order. Hence, the adoption of ARDL techniques in this paper is appropriate and consistent with the theory.

3.6 Data Description and Source

RGDP denotes real gross domestic product, INF is the inflation rate, and EXR is the nominal exchange rate of Naira to USD obtained from Central Bank of Nigeria (CBN) publications www.cenbank.gov. INV is the investment proxied by gross capital formation, and HDI is the human development index obtained from the World Bank database at www.worldbank.org. While financial access index compiled data on Bank Branches (commercial banks) per 100,000 adults, ATMs per 100,000 adults, % of people with a bank account, % of firms with a line of credit (all firms), and % of firms with a line of credit (small firms). % stock market capitalization outside of the top 10 largest companies, the total number of issuers of debt (domestic and external, non-financial corporations and financial corporations per 100,000 adults as a proxy for financial inclusion) were obtained International Monetary Fund, financial development index database. The financial access index was computed using principal component analysis (Cihak et al., 2012; Svirydzenka, 2016)

4.0 Presentation and Discussion of Results

This section present and discusses the result of ARDL estimation after testing for stationary variables. The summary statistics of the variables were presented to describe the nature of the data

Table 1 Descriptive Statistics

Statistics	GDP	INF	EXR	FIN	INV	HDI
Mean	1742.63	18.69	99.25	0.19	37.71	0.84
Median	1470.27	12.60	97.02	0.16	35.37	0.83
Maximum	2860.70	72.85	306.20	0.89	89.38	0.96
Minimum	1141.06	5.35	0.55	0.01	14.90	0.68
Std. Dev.	534.68	16.47	92.30	0.19	20.59	0.07
Skewness	0.60	1.79	0.83	2.06	1.063	-0.06
Kurtosis	1.85	5.33	3.09	7.09	3.58	2.60
Jar-Bera	4.64	30.66	4.64	56.17	8.09	0.29
Probability	0.098	0.000	0.098	0.000	0.02	0.86
Observation	40	40	40	40	40	40

Source: Authors' computation

Table 1 depicts descriptive statistics for the variables used in the study. Real gross domestic product (RGDP) has the highest mean value, while financial access has the least mean value of all the variables; RGDP has the highest median value, while financial access has the least median value. RGDP has the highest maximum value, while financial access has the least maximum value, implying that it is the least variable. The RGDP has the highest minimum value, while financial access has the least minimum value.

Furthermore, the standard deviation, which measured volatility, shows RGDP was the most volatile while financial access was the least volatile variable. The variables were positively skewed, as the skewness was all greater than 0 for normal distribution, though RGDP and EXR were close to zero (0) while HDI was less than zero (0). All the variables have excess kurtosis,

indicating a leptokurtic distribution, except for RGDP, which is leptokurtic distribution. The Jarbera probability values show INF, INV and FIN were normally distributed while RGDP, EXR, and HDI were non-normally distributed variables.

Table 2 shows the unit root test for all the variables. The variables were not stationary at level except inflation, as can be seen by ADF statistics value, were less than ADF critical value at 5 per cent level. These can also be evaluated from probability values that are greater than 0.05. It implies we cannot reject the null hypothesis of a unit root in these variables at level, and we repeated the test at first difference; the ADF values were greater than the critical value at 5 per cent, and the probability values in parentheses were less than 0.05. Hence, we reject the null hypothesis of unit root for all the variables at the first difference, implying that all the variables are integrated of order one I(1).

Table 2 Unit Root Test

	Level				**First difference**		
Variable	**ADF**	**Critical Value**	**Result**	**Variable**	**ADF**	**Critical Value**	**Result**
RGDP	-2.990 (0.047)	-3.529	Non-stationary	ΔRGDP	-5.149 (0.000)	-2.941	stationary
INF	-3.841 (0.032)	-3.529	stationary	ΔINF	-	-	-
EXR	-1.629 (0.076)	-3.529	Non-stationary	ΔEXR	-4.987 (0.000)	-2.941	stationary
FIN	-2.233 (0.459)	-3.529	Non-stationary	ΔFIN	-8.356 (0.000)	-2.941	stationary
INV	-1.892 (0.639)	-3.529	Non-stationary	ΔINV	-4.564 (0.000)	-2.941	stationary
HDI	-2.777 (0.213)	-3.529	Non-stationary	ΔHDI	-6.294 (0.000)	-2.941	stationary

Note: The figure in parenthesis is the p-value for the rejection of the null hypothesis of a unit root in variables.
Source: Authors' computation

4.1.1 Lag length selection

The first step in analysis involving the ARDL model is determining the optimal lag length for each variable in the model. The unrestricted VAR procedure for determining symmetric lag length for all variables usually produces a sub-optimal outcome. Hence, we adopt asymmetric lags selection methodology to achieve the objective.

Table 3 shows the lag lengths selection criteria of the model using four information criteria, that is, the Akaike information criteria (AIC), Schwarz information criteria (SIC), Hannan-Quinn criteria (HQC), and Adjusted R-squared (AR). AIC and AR select (**1, 2, 2, 4, 0, 2),** SIC selects (**1, 1, 0, 0, 0, 0),** while HQC selects **(1, 1, 2, 4, 0, 2)**. Since there are three different models to choose from, we examined the diagnostic properties of these models. We found the AIC and AR have first and second-order autocorrelation, HQC is not normally distributed, implying an unfit model for

cointegration analysis, while SIC has the best diagnostic property that meets the requirement for a good model. We proceed to estimate Cointegration among these variables with the best-selected ARDL **(1, 1, 0, 0, 0, 0)** model. The underlined diagnostic tests show the model is correctly specified. There is no first and second-order autocorrelation (serial correlation), No heteroscedasticity (Homoscedasticity), and No ARCH effect in the residual, and normally distributed. Hence, the model is good for inference. Pesaran et al. (2001) posited a serial correlation has consequences on Cointegration results.

Table 3 ARDL lag order Selection Criteria

Model	Model selection criteria			
	AIC **ARDL(1, 2, 2, 4, 0, 2)**	**SIC** **ARDL(1, 1, 0, 0, 0, 0)**	**HQC** **ARDL(1, 1, 2, 4, 0, 2)**	**Adj R^2** **ARDL(1, 2, 2, 4, 0,, 2)**
Diagnostic Test				
DIAGNOSTIC	$\chi^2_{FF}(1)$ =0.8575 χ^2_H =0.4699 $\chi^2_{ARH}(1)$ =0.0893 $\chi^2_{SC}(1)$ =0.0321 $\chi^2_{SC}(2)$ =0.0288 χ^2_N =0.0428	$\chi^2_{FF}(1)$ =0.7011 χ^2_H =0.7802 $\chi^2_{ARH}(1)$ =0.98113 $\chi^2_{SC}(1)$ =0.7390 $\chi^2_{SC}(2)$ =0.6259 χ^2_N =0.0519	$\chi^2_{FF}(1)$ =0.3892 χ^2_H =0.6108 $\chi^2_{ARH}(1)$ =0.1850 $\chi^2_{SC}(1)$ =0.0321 $\chi^2_{SC}(2)$ =0.0288 χ^2_N =0.0000	$\chi^2_{FF}(1)$ =0.3892 χ^2_H =0.6108 $\chi^2_{ARH}(1)$ =0.1850 $\chi^2_{SC}(1)$ =0.0321 $\chi^2_{SC}(2)$ =0.0288 χ^2_N =0.0000

Notes: χ^2_{FF} , χ^2_H, $\chi^2_{ARH}(1)$, $\chi^2_{SC}(1)$, $\chi^2_{SC}(2)$, χ^2_N are the Lagrange multiplier statistic test for functional form Mis-specification, residual heteroscedasticity, ARCH effect, autocorrelation (serial correlation), and non-normal error, respectively.
Source: Authors' computation

4.1.2 The ARDL Bound Test

Having established the appropriate lags, we estimate ARDL bound test cointegration approach. The test implemented by estimating eq. (9). Furthermore, the normalization method by taken each variable as a dependent variable as propounded by Pesaran and Pesaran (1997) using model (1, 1, 0, 0, 0, 0). This test involves imposing restrictions on the first lagged level of all variables, using F-statistic via Wald test (bound test) to determine the joint significance of the level variables.

Table 4 shows economic growth (RGDP), exchange rate (EXR), inflation rate (INF), Investment (INV), human capital development index (HDI), and Financial access (FIN) are jointly co-integrated (long-run relationship), as F-statistic from the bound test for F_{GDP}(GDP| INF, EXR, HDI, INV, FIN) = 4.45, F_{INF}(INF| GDP, EXR, HDI, INV, FIN) =4.23, F_{EXR}(EXR| INF, GDP, HDI, INV, FIN) =6.64, F_{HDI}(HDI| EXR, INF, GDP, INV, FIN) = 5.25, F_{INV}(INV| HDI, EXR, INF, GDP,

FIN) = 16.57 and F_{FIN}(FIN| INV, HDI, EXR, INF, GDP) = 5.53 are greater than upper bound of 3.62 Pesaran critical value at 5% level, five independent variables (k=5) with no constant and trend, case I, hence, it is 95 per cent certain that, these variables have a long run relationship, that is they co-move in the long run.

Table 4 Bound Co-integration Test

Dep. Variable	**No. Variable (K)**	**F-Statistics**	**Conclusion**
F_{RGDP}(RGDP| INF, EXR, HDI, INV, FIN)	5	4.454796	Cointegration
F_{INF}(INF| RGDP, EXR, HDI, INV, FIN)	5	4.225446	Cointegration
F_{EXR}(EXR| INF, RGDP, HDI, INV, FIN)	5	6.636591	Cointegration
F_{HDI}(HDI| EXR, INF, RGDP, INV, FIN)	5	5.246006	Cointegration
F_{INV}(INV| HDI, EXR, INF, RGDP, FIN)	5	16.57304	Cointegration
F_{FIN}(FIN| INV, HDI, EXR, INF, RGDP)	5	5.526610	Cointegration
Pesaran et al. (2001) Critical Value	Sign. Level	I(0) Bound	I(1) Bound
	10%	2.26	3.35
	5%	**2.62**	**3.62**
	1%	3. 41	4.68

Source: Authors' computation

4.1.3 Long Run Estimated Result

Having found the variables co-integrated, we estimate the long-run relationship between the dependent and independent variables; Table 5 presents the estimated results. The result shows that the exchange rate has a significant positive effect on Nigerian economic growth; that is, with a one per cent increase (depreciation) in Naira against the US dollar, economic growth will increase by 4.9 per cent. This result is consistent with economic theory; however, it contradicts Nigeria's situation, which has been import-dependent. An appreciation of her currency tends to improve economic growth, while depreciation always presents inflationary pressure, distortion in purchasing power, and investment decisions by local firms' investors. Even foreign investors tend to be more confident about the domestic financial market if the exchange rate is stable or appreciating because their Investment will be worth more over time.

Also**,** the inflation rate negatively impacts economic growth, a one per cent increase in the inflation rate will lead to a 2.01 per cent decline in economic growth in Nigeria, and human capital has a significant positive impact on economic growth. A one per cent rise in human capital development will lead to a 2.4 per cent increase in economic growth. Similarly, Investment has a positive and significant impact on economic growth in Nigeria. A one per cent rise in investment will lead to a 9.9 per cent growth in the economy. In the same vein, financial inclusion has a positive and

significant impact on economic growth, a one per cent increase in financial inclusion for the excluded segment of the population will contribute 11.5 per cent to economic growth in Nigeria.

This result is interesting; it implies that increasing access to finance is essential and relevant in raising RGDP growth, which will lead to poverty reduction if there is no reverse trend. Consistent with Mckinsey Global Institute (2016), where they estimated increase in financial inclusion could increase Nigeria's GDP by 12% by the year 2025, and Kama and Adigun (2013), who documented that an increase in financial access for the poor population would lead to capital accumulation and Investment which in turn spur economic growth and reduce poverty.

The adj R^2= 0.809 shows that independent variables explain 81 per cent of the dependent variable. The joint significant given by F-stat 34.0491 p-value (0.000) shows that independent variables are a significant determinant of the dependent variable. The diagnostics test shows the model is correctly specified, and variance is homogenous, no ARCH effect in the model, no first and second-order autocorrelation, and the residual is normally distributed.

Table 5 Long-run result

Dependent Variable: LOG(RGDP)

Variable	**Coefficient**	**t-Stat**	**p-value**
C	8.613	18.892	0.000
INF	-2.017	2.471	0.025
LOG(EXR)	4.968	-6.241	0.000
LOG(HDI)	2.378	2.600	0.013
LOG(INV)	9.939	2.981	0.005
LOG(FIN)	11.459	4.014	0.0003
R^2=0.833534, Adj. R^2=0.809053, F-Stat= 34.04910, p-value=0.000000, n=40, DW=2.2016248			
Diagnostics Tests			
$\chi^2_{FF}(1)$ =0.3492, χ^2_H =0.0935, $\chi^2_{ARH}(1)$ =0.4531, $\chi^2_{SC}(1)$ =0.2105, $\chi^2_{SC}(2)$ =0.5670, χ^2_N =0.3978			

Notes: χ^2_{FF}, χ^2_H, $\chi^2_{ARH}(1)$, $\chi^2_{SC}(1)$, $\chi^2_{SC}(2)$, χ^2_N are the Lagrange multiplier statistic test for functional form misspecification, residual heteroscedasticity, ARCH effect, autocorrelation (serial correlation), and non-normal error, respectively.
Source: Authors' computation

For any co-integrated variables, there must be an error correction term in the short run. Table 6 revealed the error correction term coefficient and short-run coefficients estimate. The error correction term is negative and significant at 5 per cent, consistent with the prior expectation, reinforcing the cointegration relationship found earlier. The ECM(-1) is 0.26, showing a low pace of adjustment to the equilibrium path; it implies that for any =disequilibrium from the long-run path in the short-run, 26 per cent of disequilibrium is corrected each year.

The first lag of economic growth (RGDP) has a significant positive impact on current economic growth in the short run, while the change in the inflation rate has a positive and insignificant impact on Nigeria's economic growth. The short-run price rise tends to incentivize producers to produce more and take advantage of the increase in price to make more profit. It is usually transient as the

increase in price feed into producer input price will increase production cost and decline in the total output of the economy. Furthermore, change and first lag changes of the exchange rate have a significant negative impact on economic growth. For instance, a one per cent depreciation in Naira against the US dollar will lead to a 7.3 and 0.7 per cent decrease, respectively, in economic growth in the short run. However, Investment has a significant positive impact on economic growth, and a one per cent rise in Investment will impact economic growth by 1.8 per cent. Similarly, human capital has a significant positive impact on economic growth; it implies a one per cent increase in human capital development would lead to a 1.3 per cent growth in the economy. In the same vein, financial inclusion has a positive and significant effect on economic growth; a one per cent increase in access to finance contributes 5.9 per cent to economic growth in Nigeria. The result is consistent with prior expectations that access to finance is essential to economic growth in both the short and long-run growth of an economy. It can be stated that increasing financial inclusion is a panacea for economic growth in both short-term and long-term growth.

The adj. R^2 0.782 shows that 78 per cent of movement in the dependent variable is explained by the independent variables, and the joint significant given by F-stat 5.26 p-value (0.000) shows that independent variables are a significant determinant of the dependent variable. The diagnostics test showed the model correctly specified; the variance is homogenous, no ARCH effect in the model, no first and second-order autocorrelation, and the residual is normally distributed.

Table 6 Parsimonious short-run result

Dependent Variable: D(LOG(RGDP))

Variable		**t-statistics**	**p-value**
C	7.593	32.260	0.000
D(LOG(GDPC(-1)))	0.145	2.213	0.002
D(INF)	-2.829	-1.114	0.274
D(LOG(EXR))	7.310	-3.537	0.001
D(LOG(EXR(-1)))	-0.682	-0.321	0.750
D(LOG(INV))	1.817	2.169	0.038
D(LOG(HDI))	1.291	2.976	0.033
D(LOG(FIN))	5.862	2.206	0.035
ECT(-1)	-0.262	-3.859	0.000
R^2=0.782315, Adj. R^2=0.758275, F-Stat= 5.261825, p-value=0.00031, n=38			
Diagnostics Tests			
$\chi^2_{FF}(1)$ =0.0646, χ^2_H =0.7286, $\chi^2_{ARH}(1)$ =0.1324, $\chi^2_{SC}(1)$ =0.7525, $\chi^2_{SC}(2)$ =0.6245, χ^2_N =0.7685			

Notes: χ^2_{FF}, χ^2_H, $\chi^2_{ARH}(1)$, $\chi^2_{SC}(1)$, $\chi^2_{SC}(2)$, χ^2_N are the Lagrange multiplier statistic test for functional form misspecification, residual heteroscedasticity, ARCH effect, autocorrelation (serial correlation), and non-normal error, respectively.
Source: Authors' computation

Figure 1: Cumulative Sum (CUSUM)

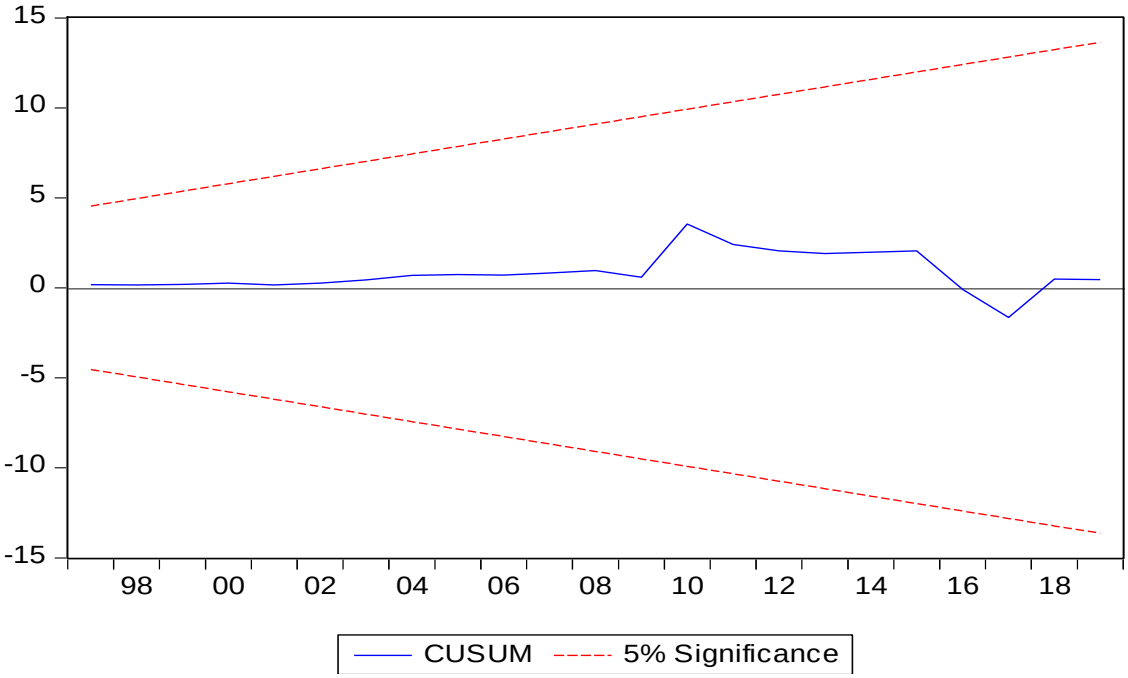
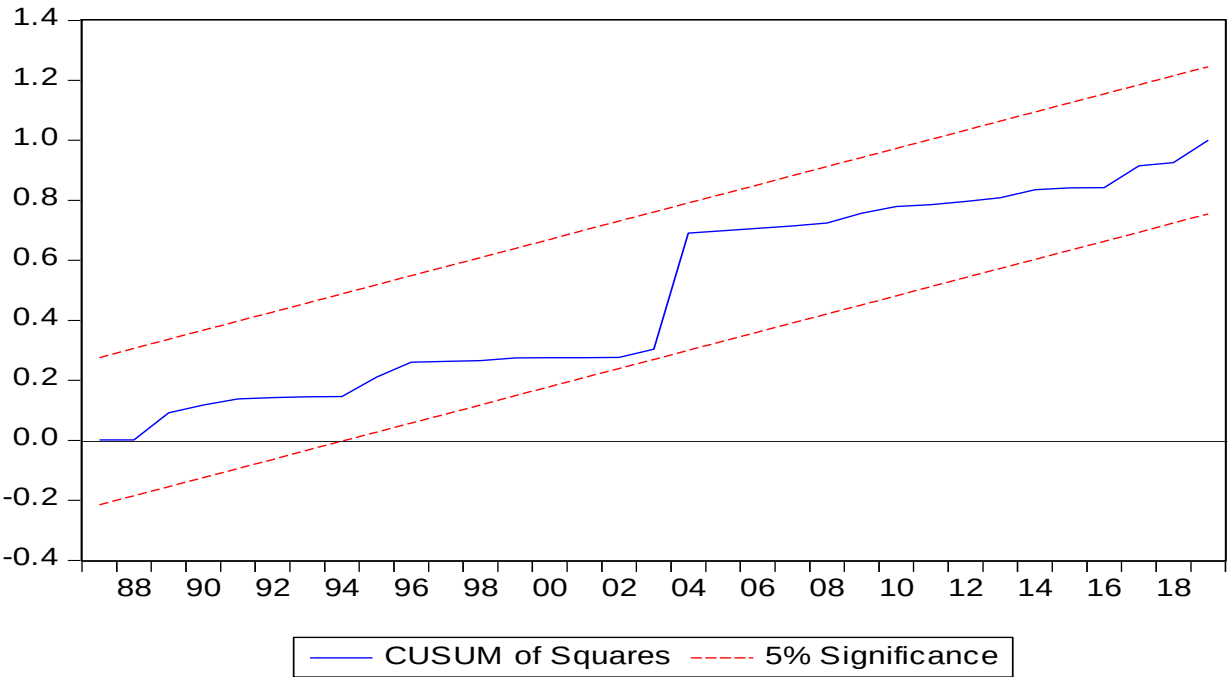


Figure 2: Cumulative Sum of Squares (CUSUMsq)



4.1.4 Test of Stability

We determine the stability of the long-run coefficient and short-run dynamics. Cumulative sum (CUSUM) and cumulative sum of squares (CUSUMsq) are usually employed. Pesaran et al. (2001) posited that there is a need to assess the error correction model's stability. Figures 1 and 2 graphically displayed CUMSUM and CUSUM squares tests. The graphs show that our coefficients are stable. Hence, the null hypothesis cannot be rejected since the plot lies within the critical upper and lower bound at a 5 per cent significance level. These statistics confirm the stability of the long-run coefficients.

5.0 Conclusion and Recommendations

The paper examines the impact of financial inclusion on Nigeria's economic growth using annual time series data from 1980 to 2019. The study employed the autoregressive distributive lag method (ARDL) and the Augmented Dickey-Fuller (ADF) unit root test. The variables mainly were integrated into order one I(1), and a long-run relationship exists.

The study found that the exchange rate positively and significantly impacted economic growth, while inflation negatively impacted economic growth in the long run. Similarly, Investment and human capital have a significant positive impact in the long run. Also, financial inclusion has a positive and significant impact on economic growth. Financial inclusion has the most impact on economic growth, contributing 11.5 per cent to Nigeria's economic growth. It implies that increasing access to finance is very important and could serve as a new engine of growth and lead to poverty reduction in the long run.

In the short run, the error correction term shows any disequilibrium that may arise in the short run; 26 per cent are corrected each year. In the same vein, first lag GDP contributes positively to current economic growth, and change in inflation rate has a positive and insignificant impact on Nigeria's economic growth, while change and first lag changes in the exchange rate have a significant negative impact on economic growth in the short run. Also, Investment and human capital have a positive and significant impact on economic growth. Furthermore, financial inclusion has a significant positive effect on economic growth in the short run. Financial inclusion is essential to economic growth in both the short and long-run growth of an economy. Therefore, the paper recommends that government should intensify efforts to increase the level of financial inclusion in the country. Financial institutions should remove unnecessary bureaucracy and institutional restrictions on access to finances. The government needs to ensure a stable price level for consumers and investment goods. Monetary authorities should ensure stable local currency to provide an appropriate economic signal to local and foreign investors who may want to invest in the country.

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