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# The Effect of Microfinance Banks on Poverty Reduction in Nigeria

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**Abstract:** The nexus between microfinance banking and poverty reduction is well documented in banking and finance literature. As a poverty reduction strategy, the microfinance initiative is expected to create room for financial accessibility to the economically active poor people. Consequently, this study estimated the effect of microfinance banks' (MFBs) on poverty reduction in Nigeria from 1992 to 2018 using the Autoregressive Distributed Lag (ARDL) approach to regression analysis. With a VAR lag order selection of two, the ARDL bounds test revealed that the poverty rate and MFBs activities were bound by a long-run relationship. The long-run estimates suggested that the MFBs loans-to-deposit ratio and liquidity ratio caused poverty reduction in the long-run. On the other hand, the short-run estimates indicated that the MFBs were unable to ensure poverty reduction within a short period, though all the variables exhibited significant coefficients within one year. These findings imply that the ability of MFBs to reduce poverty takes a long period.

**Keywords:** microfinance banks; poverty; loans-deposit ratio; liquidity; discount rate; income and ARDL.

## Introduction

All over the world, many people have been plagued by extreme poverty. Approximately 40% of the global population lives below the poverty line (World Bank, 2019). The same report from the World Bank shows that most residents in developing countries, Nigeria inclusive, lack access to formal financial services, and are impoverished as a result. Consequently, countries have promoted sustainable economic development through diverse financial policies targeted at poverty reduction. One of such financial policies is the microfinance scheme. To effectively eradicate poverty, the finance and economic experts have extensively commented on the potency of microfinance banking. Hence, microfinance policies have predominantly been featured as a poverty reduction strategy across the world (Thrikawala, Locke, & Reddy, 2013). It is based on this premise that microfinance banks are established to extend affordable and accessible financial services to the low-income earners who are often excluded from accessing formal financial services due to high lending rate and collateral demands associated with large financial institutions like commercial banks, lack of bank branches and financial illiteracy in the rural areas, the high tendency of credit default risk among the poor, etc. (CBN, 2020). In Nigeria, like other developing countries, microfinance institutions avail the major source of funds for microenterprises that are usually owned by low-income earners (or the economically active poor). Consequently, the underlying idea behind the rising of microfinance banks is the fact that low-income/poor people are financially empowered to undertake economically productive ventures that could generate income and push them above the poverty line (Awojobi, 2019; Mecha, 2017). At this point, a natural question that arises is; what is poverty and how do microfinance banks aid poverty reduction?

According to the World Bank (2002), poverty is a situation where consumption falls short of the poverty line ($1 per day) as someone living below $1 daily income would be deprived of basic human needs such as food, safe drinking water, sanitation facilities, health, shelter, education, and information, etc. It is worthy of note that the number of

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people living below $1 per day expressed as a ratio of the total population is an indicator of the poverty rate in a country. Unfortunately, approximately 40.10% of the Nigerian population are living in extreme poverty (World Bank, 2019}. Ugbede (2020), described the height of poverty in Nigeria by stating that: "*…nothing is permanent, except suffering. No job security, no safety, clothing nor gadgets… Every worker here would leave if they had a choice*", and Chepkwei (2020), affirmed that microfinance banks are anti-poverty in nature. Though research indicates that poor education and health systems, inequality and marginalization, conflict, hunger, poor governance, dilapidating infrastructure, unemployment, etc. are associated with rising poverty levels, the issue of finance remains at the forefront of the problem. For instance, Ho and Odhiambo (2011), and Onyele and Nwokocha (2016) affirmed that lack of financial accessibility deepens the problem of poverty. A report from Nigeria indicates that the poverty rate has been increasing more than the growth of national income (CBN, 2018; Ewubare & Okpani, 2018). This shows that, despite being regarded as the "economic giant" of Africa, the poverty rate in Nigeria has reached extreme heights. Figure 1 below delineates the national income and poverty trend in Nigeria:

To effectively curb poverty in Nigeria, the Central Bank of Nigeria (CBN) mandates the licensed MFBs to target "economically poor individuals", that is, "individuals or groups with meager means of livelihood and whose personal income within a period of one year falls short of the minimum taxable limit stipulated in the tax laws." According to the CBN revised supervisory and regulatory guideline for MFBs;

> "A microfinance bank (MFB), unless otherwise stated, shall be construed to mean any company licensed to carry on the business of providing microfinance services such as savings, loans, domestic fund transfers, and other financial services that economically active poor, micro-enterprises and small and medium enterprises need to conduct or expand their businesses as defined by these guidelines (CBN, 2012)."

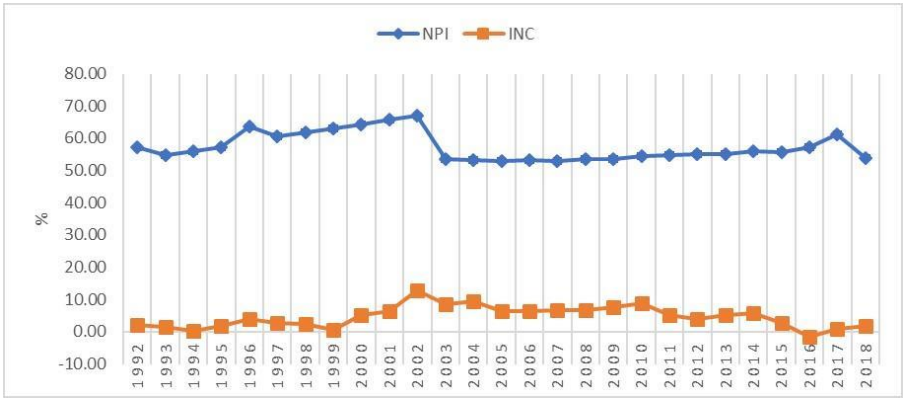


***Figure 1. Trend of income and poverty rate in Nigeria (CBN, 2018; Ewubare & Okpani, 2018)***

In view of empowering the economically poor Nigerians, the CBN guideline stipulates that an MFB customer should have the following features:

1) must have a monthly income of not more than twice the monthly per capita income of Nigeria or minimum wage, whichever is higher.
2) must have a total productive asset (inclusive of those arising from loans but excluding the cost of land) of not more than five hundred thousand Naira (₦500, 000.00) only;
3) is not a regular employee of any organization;
4) age between 18 and 60 years.

Microfinance has rapidly evolved since the mid-1990s amounting to what Harvard University's Marguerite Robinson referred to as the "microfinance revolution." Although the original idea of microfinancing based on the Grameen Bank's concept was for social

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benefits, today, most of the largest MFBs are commercial firms seeking profit for owners and investors (Thrikawala et al., 2013). It has been stressed by Watkins (2018, p.306) that commercialized microfinance banks (profit-seeking MFBs) target more financially stable investors and charge higher interest rates than those of their peers. However, microfinance interest rates have persistently dropped as the industry's regulatory systems have matured in many countries over the past decades, but not in Nigeria. This shows why the microfinance banks have been counterproductive in Nigeria (Acha, 2012). On the other hand, the CBN (2012) had projected that the microfinance finance banks would be contributing approximately 20% to total credit to economic units as against 0.9% in 2005 with the establishment of National Microfinance Bank (NMFB) in view (Nwobu, 2019). Even though it is over two decades since the advent of microfinance banking, there is surprisingly few research on the effect of microfinance banks on poverty in Nigeria. As such, this study is particularly of immense significance to policymakers who often seek such research findings to measure the effectiveness of various fiscal policies in achieving target objectives. Though there are numerous microfinance banks in Nigeria, much of the policy debate is the central question: what is the overall effect of microfinance banks on poverty reduction. Based on the foregoing, this article estimated the effect of microfinance banks on the poverty rate using annual time series data from 1992 to 2018.

## Literature review

### *Conceptual framework*

One of the factors attributed to the rising poverty rate in developing countries is the lack of finance. Finance plays a significant role in the fight against poverty (World Bank, 2008). While increasing access to formal financial services through microfinancing has generated positive responses, this has also been questioned with critics averring that high-interest rates hold the poor back in poverty (Ayyagari, Beck, & Hoseini, 2013). However, finance is seen to influence poverty from three (3) major channels viz; entrepreneurship, inter-state and credit channels. First, the entrepreneurship channel entails that the poverty-reducing impact of finance falls majorly on the self-employed in rural areas (Ho & Odhiambo, 2011). Second, it has been averred that inter-state migration of labor towards more financially developed states is a recipe for poverty alleviation (Clarke, Xu, & Zhou, 2006). The migration induced by finance is motivated by the job search, suggesting that poorer population segments in rural areas migrated to urban areas. The credit channel entails that higher credit extension has a poverty-reducing effect (Ayyagari et al., 2013).

The concept of microfinance is aimed at serving the financial needs of the poor through a viable financial system. It is also averred as documented by Mago (2014), that microfinance banks aim at providing a wide range of financial services such as deposit mobilization, the advancement of micro-loans, money transfer and other forms of payment services to the low-income earners and poor persons, households as well as their micro or small-scale enterprises. Succinctly put, the idea is that the poor earn more, accumulate assets, and become less vulnerable to external shocks as they can have financial services they need (Christensson, 2017; Obayagbona, 2018). This article infers the effect of microfinance banks on poverty reduction as illustrated in Figure 2 below:

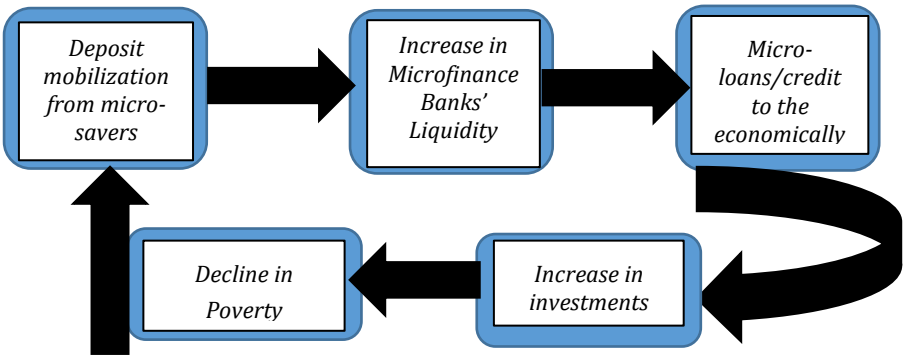


***Figure 2. Conceptual Framework***

Figure 2 shows that microfinance banks play an intermediary role just like other financial institutions. However, microfinance banks are established to mobilize deposits and grant micro-loans/credit to empower the economically active poor (such as, unemployed, small and medium scale enterprises, etc.) who lack access to formal financial services. As such, the microfinance banks have to maintain an adequate level of liquidity to execute its intermediation responsibilities to the poor (CBN, 2013). These financial activities are expected to accelerate the income and earning capacity of the vulnerable poor, increase investment flow into the rural community, and create employment at the grassroots. Though, the area of poverty targeting, measurement, and alleviation in microfinance is of significant interest to microfinance stakeholders, amidst recent criticism that the microfinance banks are straying from their original goal of poverty alleviation. Few MFBs have developed their measurement tools for tracking clients' poverty level, while a larger proportion appears to use household income/expenditure analysis as well as geographic targeting (Ghalib, 2010). However, from a broad spectrum, this study is focused on investigating the collective effects of microfinance banks on the national poverty rate in Nigeria.

## *Theoretical review*

Generally, the role of financial institutions in enhancing economic productivity has been explained by the demand following and supply leading hypotheses. The demand following the hypothesis is based on the premise that financial development reacts positively to economic growth. On the other hand, the supply leading hypothesis is hinged on the notion that the establishment of financial institutions comes first before the demand for financial services. As such, the demand following and supply leading hypotheses are based on the premise that the development of financial institutions can be concurrently growth-inducing and growth induced (Addae-Korankye, 2012). However, many studies support the supply leading hypothesis that the efficiency with which financial institutions operate is the most important issue for the economy (Taiwo, Agwu, Aregan, & Ikpefan, 2016). These studies considered the supply of innovations as well as initiatives, enterprise, and finance as the major tool for creating, transforming and expanding the industrial sector and other business-oriented activities in the economy (Kaidi, Mensi, & Amor, 2019). Consequently, based on the supply leading hypothesis, it is established that finance-led economic growth would as well generate significant poverty reduction.

Originally, microfinance banks were specifically established to enhance the social wellbeing of low-income earners. In this regard, social microfinance banking is tied to the Grameen Bank model proposed in 1976 by Prof. Muhammad Yunus in Bangladesh (Taiwo et al., 2016). The model focused on the low-income earning households while the bank functions as a unit headed by a Field Manager and bankers (workers) to oversee approximately 15 to 22 villages. These villages were usually visited by the manager and workers of the bank to familiarize themselves with their potential clients and to explain the functions, purposes, and operations of the bank. Under the Grameen Bank model, to

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receive a loan, prospective borrowers were grouped into five from which two groups received loans at first while the other groups took theirs in turns on a later date. Hence, the two groups that received loans were closely observed for one month to ensure that they conform to the rules of the bank. In a situation where the two beneficiaries of the loan repay principal over fifty-two (52) weeks, others became qualified to obtain loans. As such, there was enormous pressure from the groups to make one comply with the rules and regulations guiding the banking operations, particularly with respect to loan repayments. In the Grameen bank framework, the formation of groups was also used for other purposes such as educating the members, awareness creation, and collective bargaining (Anyanwu, 2004).

***The empirical review***

Recently, Ezeanyeji, Usifoh, Obi, and Ejefobihi (2020) investigated the linkages between microfinancing, poverty alleviation, and economic growth in Nigeria from 1992 to 2018. The data analysis was based on the Autoregressive Distributed Lag (ARDL) model. The research findings showed that microfinance banks' loans contributed significantly negative to poverty in the long-run, but failed to make any significant contribution to economic growth.

In Bangladesh, Akhter and Cheng (2020) analyzed the effectiveness of microcredit as an instrument to enhance financial accessibility among poor women in rural areas. The study used poor rural women to investigate the empowerment performance of microcredit beneficiaries compared to non-beneficiaries in the same socio-economic environment. A regression analysis was employed to accomplish these objectives. The outcome of the empirical analysis showed that there was a significant effect of microcredit on sustainable women empowerment.

Similarly, Sohn and Ume (2019) investigated the impact of microfinance on poverty alleviation using cross-country data of ninety-six (96) countries. It was found that such bank establishments had a significant effect on poverty alleviation and were effective for long-term economic and financial development. The results also showed that a good number of female recipients of micro-loans and active borrowers were likely to step out of poverty based on the random-effect and fixed-effect models applied for the data analysis.

Again, Hossen, Miah, and Ruhi (2019) examined the impact of micro-credit on poverty alleviation in Bangladesh. The paper argued that microfinance is an important tool for effective poverty reduction, especially in rural areas. The study was developed using descriptive analysis and secondary data. The results revealed that microcredit effectively reduced poverty.

Also, Tafamel (2019) investigated the linkages between microfinance institutions and poverty in Nigeria. Specifically, the study analyzed the impact of microfinancing on sampled two-hundred (200) SMEs operating in Ikpoba Okha Local Government Area of Edo State, Nigeria. Using Pearson correlation and multiple regression analysis, a positive and significant linkage between microfinance banks and poverty alleviation was found. Similarly, Mustapha, Yusuf, and Abdullahi (2019) examined the impact of Rima Microfinance Bank on income and poverty in the Goronyo Local Government Area of Sokoto State, Nigeria. A multistage sampling technique was applied for the sampling and a structured questionnaire was used for data collection. The result showed that the income increased as beneficiaries used the Rima Microfinance Bank credit facility, while poverty declined by 6%. In a similar study, Nwibo, Okonkwo, Eze, Mbam, and Odoh (2019) analyzed the effectiveness of microfinancing on poverty reduction among rural farmers in Nigeria. The study applied multi-stage random and purposive sampling in selecting two-hundred (200) farmers. Data were collated primarily through a structured questionnaire and analyzed with descriptive as well as inferential statistics. The results reaffirmed that microcredit is a prominent source of finance for rural farm households in Nigeria.

Using the financial ratio, the impact of microfinance banks on poverty reduction was investigated (Obayagbona, 2018). The study covered the time period of 1992 to 2016. The econometric techniques of correlation and ordinary least squares (OLS) were applied for the empirical investigation. The results revealed that gross earnings, loan-to-deposit ratio, and assets of microfinance institutions were significant determinants of poverty reduction in Nigeria while liquidity ratio and deposits were less significant. Again, Khanam, Mohiuddin, Hoque, and Weber (2018) evaluated the impact of microfinance services on poverty alleviation in Bangladesh. Using regression analysis, it was indicated that micro-loans by the microfinance institutions had a statistically significant positive impact on poverty alleviation.

In a study, Usifoh and Ezeanyeji (2017) explored the effectiveness of microfinance banks as a means for poverty alleviation and economic growth in Nigeria from 1992 to 2016. The study used the regression technique for data analysis. The research findings showed that microfinance assets had a significant effect on poverty alleviation and economic growth; deposit liabilities of microfinance banks had a positive but insignificant effect on poverty alleviation and economic growth; loans and advances had a negative significant effect on poverty alleviation and economic growth.
In a similar study, Oluseye (2017) appraised the role of microfinance banks in alleviating poverty in Ekiti State, Nigeria. The study employed structured questionnaires that were administered to 150 staff randomly selected from ten microfinance institutions in Ekiti state and some beneficiaries of the bank. Multiple regression was adopted for the analysis showed that the effectiveness of microfinance institutions and other independent variables positively and significantly influenced poverty alleviation in Ekiti State.

Again, Banerjee and Jackson (2016), analyzed the role of microfinance institutions in the reduction of poverty by conducting three (3) villages in Bangladesh. Findings from the study showed that microfinancing resulted in higher levels of indebtedness among already impoverished communities leading to increasing vulnerabilities to economic, social, and environmental activities. Again, to measure the impact of microfinance on poverty alleviation. Also, Puskar (2016) focused on the District of Uttar Pradesh using data collected via questionnaire, descriptive research, and interviews from Microfinance Banks and some of their customers, resident in rural areas. Findings from the research showed that microfinance was a major strategy that aided quick recovery from an economic downturn, and enhanced the living standard of the rural people.

In Nigeria, Taiwo et. al. (2016) examined the effectiveness of microfinance schemes in dispersing credit amongst the economically active poor people with data collected from field surveys from Lagos and Ogun State, Nigeria, and estimated using the Ordinary Least Squares (OLS) econometric technique. The study discovered that the majority of the sampled microfinance banks were modeled after the Grameen Bank which supports microfinance banking as a major tool for poverty alleviation.

Similarly, Okafor (2016), examined the impact of microfinance banks on the standard of living in Nigeria within the period 1993 and 2012. Multiple regression model was used for the analysis of data. The result indicated that microfinance banks' activities had no significant positive impact on the standard of living in Nigeria, which was contrary to the objectives of the CBN's microfinance policy.

Using survey research, Nwaeze, Ogbodo, and Nwabekee (2015) investigated the contribution of microfinance banks in the fight against poverty in Nigeria. The study used structured questionnaires for data collection while the data analysis was done using simple percentages and tables. The results indicated that microfinance banks had no significant contribution to the fight against poverty in Nigeria because most of the microfinance banks were not located in rural areas where poverty was predominant.

In Ghana, Boateng, Boateng, and Bampoe (2015) ascertained the impact of microfinance banks on poverty alleviation. The study applied both economic and social variables such as personal income, growth of household, accessibility of education, housing, and

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participation in social and religious activities as benchmarks for estimating the impact. Questionnaires were administered to sixty (60) beneficiaries and customers of two microfinance banks namely, Opportunity International Savings and Loans Ltd. and Sinapi Aba Savings and Loans Company Ltd. The study discovered a direct link between microfinance banks and the poverty index.

This time in Malaysia, Samer, Majid, Rizal, Muhamad, Halim, and Rashid (2015) examined the contribution of Amanah Ikhtiar Malaysia (AIM) microfinance bank on the income level of households. A cross-sectional survey based on interviews conducted for 780 clients in Selangor and Melaka. The stratified random method was used to collate the data from the urban and rural districts of the country. Findings from the multinomial logistic revealed that AIM had a positive impact on the income level of households.

In Nigeria, Ilegbinosa and Opara (2014) examined the relationship between microfinancing and poverty alleviation in Edo State, Nigeria. The study used primary data collated from selected microfinance banks in Edo State and utilized quantitative tools for its analysis. The results obtained from the analysis showed that microfinance has great potentials for poverty reduction by facilitating wealth creation.

In a similar study, Ihugba, Bnakong, and Ebomuche (2013) appraised the effectiveness of microfinance banks in poverty eradication in Imo State, Nigeria. The area of study was sixteen (16) sample units from the local government areas in Imo state. The study purposefully selected twelve (12) microfinance banks, four (4) from each of the three (3) Senatorial Zones (Owerri, Okigwe and Orlu) with Three Hundred and Eighty-Two questionnaires (382) randomly distributed to clients of these selected microfinance Banks; eighty-two from Owerri, one hundred from Okigwe and two hundred from Orlu. From the results, it was revealed that high-income earners have more capacity to accumulate savings than the poor.

Also, Opara (2010) focused on the contribution of microfinance institutions to poverty reduction using regression analysis on a quadratic equation model. The outcome of the analysis revealed that the impact of microfinance on the poverty rate in Nigeria was in two phases. First, the take-off stage saw poverty as increasing at a slow pace as micro-loans increased. The second phase that started in 2001 witnessed a persistent increase in micro-loans and a drastic reduction in the poverty rate in Nigeria. Thus, the study concluded that microfinance loans caused poverty to reduce in Nigeria.

## Methodology

It has been well-acknowledged that lack of financial inclusion is one of the major factors affecting persistent poverty in a country. The supply-leading theory of financial development and the Grameen Bank suggests that financial accessibility could lift many people out of poverty. Following Morduch (1994), poverty is formally defined as:

$$C_t < z < Y^p \quad (1)$$

Where, $Y^P$, $C_t$ and $z$ denote household's income, consumption level, and the poverty line, respectively. This is as summarized by Ewubare and Okpani (2018), that when consumption ($C_t$ ) and income ($Y^p$) falls below the poverty line ($z$), poverty as well as income inequality set in. To confirm this argument, a benchmark intertemporal model for consumption decision was developed based on the Life-Cycle Permanent Income Hypothesis (LC-PIH). The LC-PIH is a consumption theory that people are willing to spend at a level compatible with their expected long-term income, where this expected long-term income is seen as the "permanent" income that could be safely consumed. Based on the LC-PIH framework, a household is expected to maximize the discounted value of intertemporal utility, following an intertemporal budget constraint as shown below in equation (2):

$$Max\ (C_t)\ \sum_{t=0}^{\infty}\ \left(\frac{1}{1+\delta}\right)^t U(C_t);\ s.t.\ \sum_{t=0}^{\infty}\ \left(\frac{1}{1+r}\right)^t (C_t) = \sum_{t=0}^{\infty}\ \left(\frac{1}{1+r}\right)^t Y_t + (1+r)A_t \quad (2)$$

where $U$ is an instantaneous consumption $(C)$ utility function $Y\ and\ A$ denotes the exogenous income and net financial asset, respectively while $r\ and\ \delta$ denote time-invariant lending rate and discount rate, respectively. From the first-order conditions of equation (2), the consumption Euler equation was derived as follows:

$$U'(C_t) = \left(\frac{1+r}{1+\delta}\right) U'(C_{t+1}) \qquad (3)$$

Assuming there is an absence of consumer-tilting (that is, when consumers delay spending due to largely expected expenditure in the future, and *vice versa* when future expected expenditure is small), a situation defined as $r = \delta$, then it implies that $C_t = C_{t+j}$. A combination of this result with the intertemporal budget constraint obtained in equation (2), an analytical solution for the optimal level of consumption was obtained as follows in equation (4) below:

$$C_t = \left(\frac{r}{1+r}\right)\left[(1+r)A_t + \sum_{t=0}^{\infty}\ \left(\frac{1}{1+r}\right)^t y_t\right] \qquad (4)$$

Equation (4) above indicates that the level of optimal consumption represents the value of annuity associated with aggregate wealth denoted in the squared bracket, where aggregate wealth comprises initial net financial/physical assets as well as human assets defined as the sum of discounted future income. This consumption function represented by equation (4) is the LC-PIH. On the other hand, the annuity value associated with the aggregate wealth is known as the permanent income expressed by equation (5) below:

$$Y^P = \left(\frac{r}{1+r}\right)\left[(1+r)A_t + \sum_{t=0}^{\infty}\ \left(\frac{1}{1+r}\right)^t y_t\right] \qquad (5)$$

Since the LC-PIH is hinged on the assumption that $C_t = Y^P$, it becomes clear that national poverty denoted as $C_t < z < Y^p$, occurs when the LC-PIH assumption is negated. There are two (2) fundamental situations that could cause deviations from the LC-PIH, viz; the cases of credit constraint, and financial savings for precautionary motives. However, this paper is exclusively focused on credit supply, specifically, micro-credit supply by the microfinance banks. Lack of formal credit is denoted by equation (6) below:

$$A_t + y_t \geq C_t \qquad (6)$$

*Ceteris paribus*, when there is credit constraint, it would be expected that:

$$A_t + y_t = C_t \qquad (7)$$

Now, assuming a household is negatively affected by a low level of income $y$, there will be a financial constraint. In this scenario, an inflow of income, $y$, will persistently fall, hence low assets, $A$, and households' level of consumption will become zero (Mago, 2014). Additionally, with a constraint to credit, households cannot access funds to cushion the falling income and low assets, hence there will be a minimal level of consumption. Hence, with the possibility of credit constraint and consumption being dependent on income, it becomes obvious that a situation where $C_t < z < Y^p$ could arise, especially when there is a decline in income. As such, a high poverty rate might arise due to financial constraints experienced by poor households.

Building on equation (7), the possible effect of microfinance banks on poverty reduction becomes glaring. Hence, the model used for this study's estimation was denoted by equation (8) below:

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$$NPI = \beta_0 + \beta_1 LDR_t + \beta_2 LQR_t + \beta_3 NRB_t + \beta_4 DCR_t + \beta_5 INC_t + \mu_t \quad (8)$$

Where,
NPI = National poverty index for Nigeria
LDR = Loans-to-deposit ratio
LQR = Liquidity ratio
NRB = Number of reporting banks
DCR = Discount rate
INC = Income level of Nigeria
μ = Error term
$\beta_0$ = Constant parameter
$\beta_1 - \beta_5$ = Coefficient of the independent variables

***Description of model variables and sources of data***

The model variables were briefly described, stating the reasons for which they were included in the regression model. Data on the variables were sourced from the Central Bank of Nigeria Statistical Bulletin.

The description of the variables is as follows:

1) **National poverty index (NPI):** This was used to measure the poverty level in Nigeria. According to the World Bank Group, it is measured by the ratio of the number of people living below the poverty line (below income level of $1.90/day) in Nigeria expressed as a ratio of the total population. Higher ratios imply a higher poverty rate.
2) **Loan-to-deposit ratio (LDR):** The LDR is calculated by dividing the MFBs' total loans by the aggregate deposits for the same period. As a performance index, the LDR indicates the MFBs ability to cover loan losses as well as the withdrawal its customers.
3) **Liquidity ratio (LQR):** LQR denotes the ratio of banks' liquid assets to the banks' liabilities in the same period. In other words, the LQR refers to the sum of cash balance and assets that can be converted to cash to meet short-term obligations. In Nigeria, banks are expected to have a minimum LQR of 30%.
4) **A number of reporting banks (NRB):** This variable measures the number of licensed MFBs operating in Nigeria. An increase in the number of well-functioning MFBs across the country would enhance financial accessibility to the poor.
5) **Discount rate (DCR):** Popularly known as monetary policy rate in Nigeria, the DCR was used to capture the effect of monetary regulation. High DCR implies that banks and other financial institutions borrow from the Central Bank at a high-interest rate and vice versa for a low interest rate. Hence, DCR plays a crucial role in microfinancing and poverty reduction in Nigeria.
6) **Growth in income (INC):** Poverty is affected when income growth capacity shrinks. Growth in income provides a means for exploring new investments, expansion of existing businesses, and improvement in the standard of living. As such, sustained poverty reduction programs would be successful when the income level is increasing without credit constraint. In the context of this paper, income growth was measured by the annual real GDP growth rate for Nigeria.

***Techniques of Data Analysis***

Prior to the empirical investigation, the order of integration of the variables was investigated as regression outcomes of non-stationary variables are often spurious output. This stage is crucial because the Autoregressive Distributed Lag (ARDL) approach requires that none of the variables is I (2) to avoid misleading results (Pesaran, Shin, & Smith, 2001). The Augmented Dickey-Fuller (ADF) test was used to ascertain the order of integration of the variables. The equation for the ADF test is given by equation (9) as follows:

$$\Delta y_t = \beta_0 + \beta_1 t + \beta\lambda y_{t-1} + \sum_{j-1}^{p} \quad \delta_j \Delta y_{t-j} + \mu_t \qquad (9)$$

Where,
$y_{t-1}$ = Lagged value of $y_t$ at first difference
$\Delta y_{t-j}$ = A change in lagged value
δ = Measure of lag length
$\Delta y_t$ = First difference of $y_t$
$\mu_t$ = Error term

After testing for the stationarity of data, the next step was to confirm the existence of a long-run relationship among the model variables. In the long-run estimation, a two-step process was involved; which are the bounds test for co-integration and the error correction model (ECM) version of the ARDL framework. The ECM is based on the fact that previous years' deviation from a long-term equilibrium (the error), affects the short-run dynamics.

The general ARDL model of equation (8) is written as shown by equation (10) below:

$$\Delta NPI_t = \alpha_0 + \sum_{i=1}^{n} \beta_1 \Delta NPI_{t-1} + \sum_{i=1}^{n} \beta_2 \Delta LDR_{t-1} + \sum_{i=1}^{n} \beta_3 \Delta LQR_{t-1} + \sum_{i=1}^{n} \beta_4 \Delta NRB_{t-1} + \sum_{i=1}^{n} \beta_5 \Delta DCR_{t-1} + \sum_{i=1}^{n} \beta_6 \Delta INC_{t-1} + \phi_1 NPI_{t-1} + \phi_2 LDR_{t-1} + \phi_3 LQR_{t-1} + \phi_4 NRB_{t-1} + \phi_5 DCR_{t-1} + \phi_6 INC_{t-1} + \varepsilon_t \qquad (10)$$

Where,
Δ = first difference operator
$\alpha_0$ = drift component
$\beta_1 - \beta_6$ = short-run dynamics of the model
$\phi_1 - \phi_6$ = long-run dynamics of the model
$\varepsilon_t$ = the serially uncorrelated disturbance with zero mean and constant variance.

In a bid to investigate the long-run relationship, the bounds test was employed. If the calculated F-statistic obtained from the bounds test falls below the lower bound critical values at 5% or 1% level of significance, the null hypothesis of no cointegration $(\phi_1, \phi_2, \phi_3, \phi_4, \phi_5, \phi_6 = 0)$ is accepted. Conversely, if the F-statistic is greater than the critical value of the upper bound at either 5% or 1% level of significance, the null hypothesis of no cointegration is rejected. After establishing the presence of cointegration, the long-run ARDL model was estimated based on equation (11) below:

$$NPI_t = \alpha_0 + \phi_1 LDR_{t-1} + \phi_2 LQR_{t-1} + \phi_3 NRB_{t-1} + \phi_4 DCR_{t-1} + \phi_5 INC_{t-1} + \varepsilon_t \qquad (11)$$

The optimal lag orders of the variables were chosen using the Akaike Information Criteria (AIC) to determine the structure of the ARDL specification. After the ARDL estimation and computations of its long-run multipliers, the error correction model (ECM) was formulated to estimate the short-run dynamics and the speed of adjustment using equation (12):

$$\Delta NPI_t = \alpha_0 + \sum_{i=1}^{n} \beta_1 \Delta NPI_{t-1} + \sum_{i=1}^{n} \beta_2 \Delta LDR_{t-1} + \sum_{i=1}^{n} \beta_3 \Delta LQR_{t-1} + \sum_{i=1}^{n} \beta_4 \Delta NRB_{t-1} + \sum_{i=1}^{n} \beta_5 \Delta DCR_{t-1} + \sum_{i=1}^{n} \beta_6 \Delta INC_{t-1} + \prec ECM_{t-1} + \varepsilon_t \qquad (12)$$

$ECM_{t-1}$ = lagged error correction term obtained from the cointegration model
$\prec$ = speed of adjustment parameter which is expected to be less than zero

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## Empirical results

### *Summary statistic*

From the summary statistic displayed in Table 1 below, the mean reveals that the national poverty index (NPI) maintained an average rate of 57.32% while income (INC) averaged 4.61%. This indicates that the poverty rate was increasing faster than the income level. The liquidity ratio (LQR) and loan-to-deposit ratio (LDR) of the MFBs averaged 57.66% and 52.82% respectively. The average rate of 57.66% associated with LQR is higher than the 30% recommended by the CBN, while the average LDR indicates that the MFBs extended approximately 52.82% of deposits as micro-loans to their customers. The number of reporting MFBs (NRB) averaged 743.33 banks while the discount rate (DCR) reached an average of 13.57% within the period under study. The standard deviation (Std.Dev.) shows the degree of departure of each variable from their respective mean values, thus indicating the degree of volatility associated with the data.

The skewness which is a measure of the asymmetry of the distribution around its sample mean indicates that all the variables except LQR and NRB are positively skewed. The positive skewness of NPI, LDR, DCR, and INC implied that the distribution of these variables has long right tails, meaning that the series of data contains higher values than the sample mean. On the other hand, the negative skewness of LQR and NRB implies that the series for these variables have lower values than their respective sample mean. Looking at the Kurtosis (measures the peakness or flatness of the distribution of the series), it could be seen that the distribution of NPI, LQR, and INC was platykurtic (flatted-curve) since the Kurtosis values were less than 3, while those of LDR, NRB, and DCR were leptokurtic (peaked-curve) since the Kurtosis values were greater than 3. It could be deduced from the Jarque-Bera probabilities that all the variables were normally distributed, except for DCR.

***Table 1. Summary statistic***

| | NPI | LDR | LQR | NRB | DCR | INC |
|---|---|---|---|---|---|---|
| Mean | 57.32000 | 62.82333 | 57.66519 | 743.3333 | 13.57407 | 4.612593 |
| Median | 55.80000 | 56.99000 | 58.70000 | 753.0000 | 13.50000 | 5.040000 |
| Maximum | 66.90000 | 126.1900 | 83.34000 | 987.0000 | 26.00000 | 12.74000 |
| Minimum | 52.99000 | 23.43000 | 23.57000 | 334.0000 | 6.000000 | -1.610000 |
| Std. Dev. | 4.352748 | 23.08088 | 15.35095 | 144.9979 | 4.021466 | 3.312943 |
| Skewness | 0.882141 | 0.766529 | -0.424539 | -0.757623 | 0.845819 | 0.322448 |
| Kurtosis | 2.385276 | 3.540628 | 2.745127 | 3.721919 | 5.150728 | 2.740849 |
| Jarque-Bera | 3.926898 | 2.972863 | 0.884131 | 3.169278 | 8.423175 | 0.543432 |
| Probability | 0.140373 | 0.226178 | 0.642708 | 0.205022 | 0.014823 | 0.762071 |
| Observations | 27 | 27 | 27 | 27 | 27 | 27 |

Figure 3 below shows a brief description of the number of MFBs and their financial performance in Nigeria. The figure indicates that, though there were quite a number of MFBs within the period, 1992 and 2018, their financial performance was relatively poor. Assessing the financial performance of the MFBs, it is observed that higher LDR was associated with periods when the NRB decreased, especially in 2017 and 2018. Also, between 1994 and 1999; as well as 2001 and 2007, there was a significant decline in licensed MFBs but LDR increased probably due to aid donors from the World Bank and African Development Bank (AfDB) which were disbursed through the MFBs (Kargbo, 2012). It is also observed that the MFBs maintained high LQR between 1992 and 2015, but the LQR ranged from 23.57% to 36.27% between 2016 and 2018 probably due to the 30% officially recommended by the CBN to curtail excess liquidity among the microfinance banks (CBN, 2020). In general, the trend analysis is indicative of the fact that the number of licensed MFBs might not guarantee better financial performance.

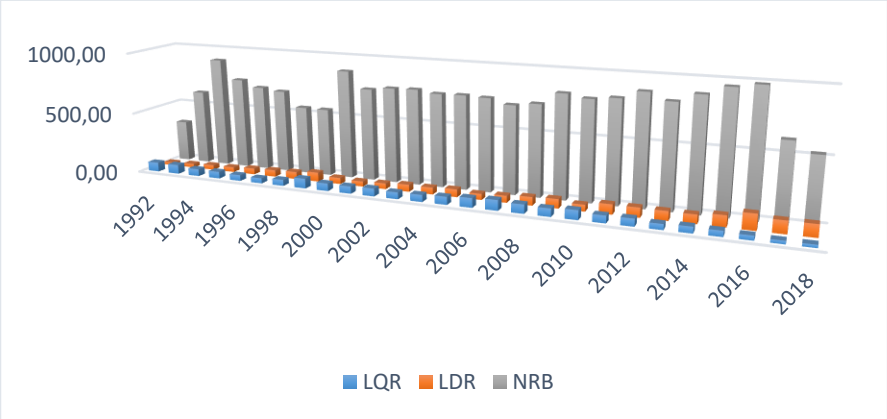


***Figure 3. Measures of MFBs activities in Nigeria (CBN, 2018)***

***Unit root test***

The empirical investigation began with the unit root testing using the Augmented Dickey-Fuller (ADF) approach. Table 2 below reports the ADF test statistic and its probability values.

***Table 2. Unit root test results***

| **Variable** | **ADF @ Level** | **ADF @ First Difference** | **Order of Integration** |
|---|---|---|---|
| NPI | -2.328471 {0.4053} | -5.114254 {0.0019}* | I(1) |
| LDR | -3.298720 {0.0886} | -4.372157 {0.0110}* | I(1) |
| LQR | -1.667341 {0.7367} | -5.430925 {0.0009}* | I(1) |
| NRB | -4.111170 {0.0176}* | -- | I(0) |
| DCR | -3.151340 {0.1160} | -9.224471 {0.0000}* | I(1) |
| INC | -1.863168 {0.6443} | -4.668915 {0.0059}* | I(1) |

***I(0) and I(1) indicates if a variable is stationary at a level or first difference, respectively.***
***Figures in { } are probability values of the critical values***

Table 2 above shows that for NPI, LDR, LQR, DCR, and INC there is the presence of unit root at a level while NRB was stationary at level. This decision was based on the fact that NRB has a probability value that is less than 0.05 at a level while the other variables produced probability values that are less than 0.05 at the first difference. Thus, the variables are a mix of both I(0) and I(1) implying that the Autoregressive Distributed Lag (ARDL) approach would be more appropriate for the data analysis (see, Pesaran et al., 2001). The mixed order of integration implies that the variables could be mutually cointegrated, thus suggesting a long-run relationship between the variables under consideration.

***Bounds testing for cointegration***

Having ascertained the order of integration, the study proceeded with the bounds testing to confirm the existence of a long-run relationship (cointegration) among the variables. Since the computation of the F-statistic for cointegration is sensitive to lag length, the optimal lag length was selected based on the various lag selection criteria listed in Table 3. Of all the lag selection criteria, only the SC recommended a lag order of one (1) while the others selected a lag order of two (2). Hence, the ARDL model was based on a maximum lag order of two as suggested by the majority of the lag order selection criteria in Table 3 below:

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***Table 3. VAR lag order selection criteria***

| Lag | LogL | LR | FPE | AIC | SC | HQ |
|---|---|---|---|---|---|---|
| 0 | -551.4264 | NA | 9.38e+11 | 44.59411 | 44.88664 | 44.67524 |
| 1 | -480.0403 | 102.7959 | 6.06e+10 | 41.76322 | 43.81094* | 42.33117 |
| 2 | -425.1697 | 52.67576* | 2.40e+10* | 40.25358* | 44.05647 | 41.30834* |

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

The results obtained from the ARDL bounds testing have been presented in Table 4 below. The results of the bounds test for the long-run relationship produced a calculated F-statistic of 6.141986 (see, Table 4 below). The F-statistic value (6.141986) is greater than the critical value of the upper bounds value of 3.38 and lower bounds value of 2.39 at 5% critical value, implying that the null hypothesis of no cointegration cannot be accepted, thus indicating there was a cointegrating relationship among the variables.

***Table 4. Bounds test***

| Test Statistic | Value | Signif. | I(0) | I(1) |
|---|---|---|---|---|
| F-statistic | 6.141986 | 10% | 2.08 | 3 |
| k | 5 | 5% | 2.39 | 3.38 |
| | | 2.5% | 2.7 | 3.73 |
| | | 1% | 3.06 | 4.15 |

***Note:*** Selected Model: ARDL(1, 2, 2, 2, 2, 2) represents the optimal lag length for the variables in the following order; NPI, LDR, LQR, NRB, DCR, and INC. The table shows the possibility of long-run relationships in the model as represented by equation (10).

***Long-run estimates of the ARDL model***

The long-run coefficient estimates of the Selected Model: ARDL(1, 2, 2, 2, 2, 2) were reported in Table 5 below. Looking at the coefficient estimates, it was observed that the effect of LDR and LQR on NPI was negative but LDR was significant at a 10% level while LQR was significant at a 5% level. This shows that both increases in LDR and LQR caused NPI to drop by 0.119764 and 0.248342 in the long-run. This situation reveals that most economically active poor people in Nigeria had access to MFBs services. This could also imply that loans extended to the poor were efficiently used, invested and yielded optimal returns that caused an appreciable reduction in the NPI. This finding aligns with Ezeanyeji et. al. (2020) and Opara (2010), that drastic poverty mitigation was witnessed in the long-run amidst a persistent increase in micro-financing. Also, this lends credence to the supply leading hypothesis of financial development.

***Table 5. Long-run estimates***

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| | | | | |
| LDR | -0.119764 | 0.057227 | -2.092797 | 0.0697 |
| LQR | -0.248342 | 0.097416 | -2.549307 | 0.0342 |
| NRB | 0.000430 | 0.010431 | 0.041271 | 0.9681 |
| DCR | -0.190172 | 0.291405 | -0.652602 | 0.5323 |
| INC | -0.437087 | 0.327274 | -1.335539 | 0.2184 |
| C | 83.96471 | 12.83332 | 6.542712 | 0.0002 |

***Note:*** coefficients are adjudged significant if Prob.* is less than 0.05 (5% level of significance). The table reports the long-run coefficients of the model based on equation (11).

The coefficient of NRB implies that an increase in the number of MFB branches caused NPI to increase insignificantly by 0.000430. This indicates that the MFBs might have struggled to remain in business and where sited in rural areas might be reluctant to lend to the rural poor due to credit default. Little wonder why most MFBs in Nigeria voluntarily liquidate or close shop after a short period of operation. This implies that an increase in the number of MFBs might not guarantee poverty reduction after a long period.

The long-run results are in tandem with prior empirical works such as Ezeanyeji et al (2020), Hossen et al. (2019), Mustapha et al. (2019), Obayagbona (2018), Sohn and Ume (2019), Tafamel (2019), Usifoh and Ezeanyeji (2017), that poverty reduction is significantly tied to microfinance banks' activities in Nigeria. All of the aforementioned studies opined that MFBs loans and liquidity helped to curb poverty. There are other empirical works such as Banerjee and Jackson (2017), Khanam et al. (2018), Oluseye (2017), who had concluded that poverty rate trended upwards even with the presence of microfinance banks. In fact, Banerjee and Jackson (2017) stated that microfinancing resulted in higher levels of indebtedness among already impoverished communities leading to increasing vulnerabilities to economic, social, and environmental activities. The disparity in these findings could be associated with the different modes of data analysis, the time period covered, measurement of variables, and geographical differences. However, the results of Obayagbona (2018) directly conform with that of this study as it showed that the loans-to-deposit ratio of the MFBs in Nigeria helped to reduce national poverty. On the other hand, Nwaeze et al. (2015) attributed the weakness of MFBs in the fight against poverty to the fact that most of the MFBs were located in the urban areas rather than the rural areas where poverty is more obvious.

***Error correction mechanism (ECM)***

The ECM presented in Table 6 shows the speed at which NPI returns to equilibrium after a change in the explanatory variables. The lagged error correction term denoted by CointEq(-1)* shows a negative (-0.786813) and significant (0.0000) coefficient as expected. This suggests that about 78.16813% of the deviations from long-run equilibrium were corrected annually. Also, the CointEq(-1)* indicates a very high speed of adjustment to equilibrium after a shock. Intuitively, it then implies that disequilibria in the short-run took at least one year to reestablish full long-run equilibrium. This further supports the existence of cointegration (long-run relationship) among the model variables as earlier confirmed by the bounds testing (see, Table 4). The short-run dynamics revealed that, within a period of one year, all the independent variables were significant in explaining NPI in Nigeria, but they were unable to curb poverty as all the independent variables had positive coefficients. This implies that poverty might not be effectively controlled by microfinance banks within a short period. A plausible reason for this could be attributed to the fact that the MFBs might mobilize deposits within a short period but may take a longer period to extend loans as they carefully appraise potential borrowers to ensure the viability of investments for which such loans are demanded. Also, the large population of Nigeria might pose a serious challenge towards the allocation of funds since such funds are often limited. Another plausible reason could be because most MFBs (especially, the commercial MFBs) often fear the risk of default when it comes to lending to the poor. Again, even when low-income earners had received loans, investments or business setups with the funds might not yield immediate returns as many businesses could be capital intensive in the short-run, hence the persistence in poverty rate (see, Opara, 2010).

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***Table 6. Error Correction Mechanism***

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| D(LDR) | 0.066923 | 0.023603 | 2.835387 | 0.0220 |
| D(LDR(-1)) | 0.110824 | 0.027407 | 4.043671 | 0.0037 |
| D(LQR) | 0.038201 | 0.024468 | 1.561241 | 0.1571 |
| D(LQR(-1)) | 0.181847 | 0.031479 | 5.776834 | 0.0004 |
| D(NRB) | 6.49E-05 | 0.002718 | 0.023887 | 0.9815 |
| D(NRB(-1)) | 0.017017 | 0.002171 | 7.837995 | 0.0001 |
| D(DCR) | 0.683637 | 0.098885 | 6.913465 | 0.0001 |
| D(DCR(-1)) | 0.620615 | 0.089097 | 6.965576 | 0.0001 |
| D(INC) | 1.286683 | 0.143717 | 8.952868 | 0.0000 |
| D(INC(-1)) | 0.597283 | 0.195083 | 3.061696 | 0.0155 |
| CointEq(-1)* | -0.786813 | 0.090709 | -8.674060 | 0.0000 |

***Note:*** The CointEq(-1)* represents the error correction term, while the differenced "D" coefficients represent the short-run dynamics based on equation (12). Each coefficient is adjudged significant if prob. value is less than 0.05 and *vice versa*.

### *Diagnostic Tests*

The following diagnostic tests were performed to ensure the validity of the ARDL model; serial correlation, normality test, and heteroscedasticity. The diagnostic test results in Table 7 below indicate no evidence of autocorrelation at a 5% confidence level and the model passed the test for normality as the residuals proved to be normally distributed. Also, there was no existence of heteroscedasticity in the ARDL model. Hence, these diagnostic tests indicate whether the ARDL model is reliable and stable.

| ***Breusch-Godfrey Serial Correlation LM Test:*** | | | |
|---|---|---|---|
| F-statistic | 1.120727 | Prob. F(2,6) | 0.3859 |
| ***Heteroskedasticity Test: Breusch-Pagan-Godfrey*** | | | |
| F-statistic | 0.161454 | Prob. F(16,8) | 0.9990 |
| ***Normality Test:*** | | | |
| Jarque-Bera | 0.489461 | | 0.7829 |

***Figure 7. Diagnostic tests***

**Note:** Accept null hypothesis of no serial correlation heteroskedasticity and normally distributed residuals if prob. is greater than 0.05.

To test the stability of the ARDL estimates, the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMSQ) were applied as shown in Figures 4 and 5 below. The plots of the CUSUM and CUSUMSQ fell within the boundaries (blue line in-between the two red dotted lines in the figures) implying the stability of the ARDL estimates. The model appears to be stable and properly specified given that none of the two tests statistics was outside the bounds of the 5% level of significance.

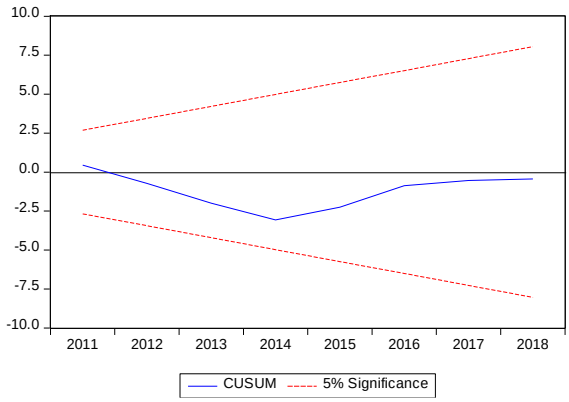


***Figure 4. CUSUM test***
***Source: Authors' calculations using EViews 10.0***

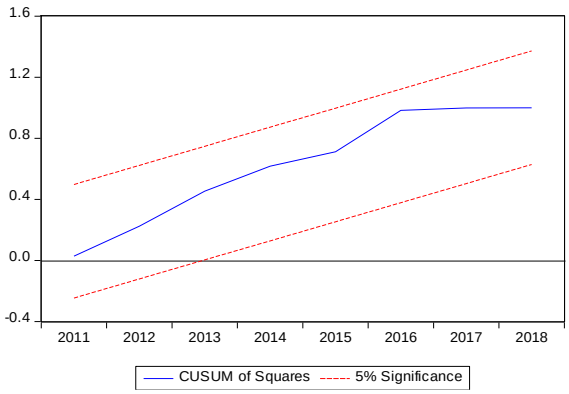


***Figure 5. CUSUMSQ test***
***Source: Authors' calculations using EViews 10.0***

## Conclusion

This paper appraised the effect of microfinance banks on poverty reduction in Nigeria from 1992 to 2018. Generally, from the ARDL estimation, findings from the analysis suggest that microfinance banks' (MFBs') performance (measured by loans-to-deposit ratio and liquidity ratio) and poverty rate in Nigeria are bound by a long-run relationship amidst changes in a number of MFBs, income and the discount rate. Arguably, the most important finding from this study is that microfinance banks significantly reduced the poverty rate in the long-run. The long-run potency of MFBs in poverty reduction can be seen from the negative coefficients of the two major bank performance ratios, viz; loan-to-deposit ratio and liquidity ratio (see, table 5). On the other hand, the coefficients of the short-run dynamics revealed that the poverty rate for Nigeria was increasing despite the presence of many microfinance banks. This implies that the microfinance banks were not capable of covering the financial requirements of the teeming poor population within a short time period due to insufficient liquidity.

The inability of the microfinance banks to curtail poverty within a short-term period in Nigeria could also be attributed to the fact that the number of people served by the banks has been low due to inconsistencies in government policies, inadequate requisite human capital, lack of adequate infrastructures and poor governance that probably to a long time to fix. This aligns with a recent survey carried out by Enhancing Financial Innovation and Access (EFInA) which revealed that the MFBs in Nigeria were able to serve about 3.8% of the poor (EFInA, 2019). The EFInA (2019) attributed this undesirable trend to the fact that most of the MFBs that were licensed at inception were community banks that lacked requisite expertise, manpower, and management. According to the EFInA (2019), before their licenses were repealed in 1995, Community Banks were viewed as government-funded institutions that extended loans with little plans towards its recovery, leading to

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the collapse of several MFBs. Hence, there is a need to reposition the microfinance banks through effective recapitalization exercise alongside improved supervisory oversight towards ensuring their effectiveness in the fight against poverty in Nigeria.

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