Micro Finance Bank Operations and Economic Development: Nigeria in Perspective

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Abstract

This study examines the effects of microfinance banks operations on economic development in Nigeria. Given the problems saddling the operations of Microfinance banks such as loan repayments, inadequate finance, high operating cost and a myriad of others this study made emphasis on the expected and observed effects using Gross Domestic Product per Capita (proxy for economic development) as dependent variable, Micro Finance Bank Deposit, Micro Finance Bank Loans, Micro Finance Bank investments, Micro Finance Bank Interest Rate (to capture microfinance bank operations) as dependent variables. The study employed Auto Regressive Distributive Lag (ARDL) technique on time series data gathered on the dependent and independent variables from 1993 to 2022 for the analysis. Results from the estimations showed that for the period under review there exists a long run relationship between the dependent and independent variables, the analysis further revealed that the R^2 which measures the overall goodness of fit of the entire ARDL model has a very high good fit. This is represented with the R^2 value of 0.9984 (99.84%). This indicates that the independent variable accounted for about 99.84% variation in the dependent variable. It was therefore recommended that micro finance banks should increase their credit operations to the productive sector of the economy so as to enhance productivity, which will in turn lead to increased economic growth and development.

Keywords: Bank deposit, gross domestic product per capita, micro finance bank, micro finance bank loans, micro finance bank investment and micro finance bank interest rate

Introduction

Microfinance refers to the provision of financial services like loans, savings, etc to individuals on a small-scale level; it is expected that these loans increase small businesses in developing countries. It is also provision of finance to small business with moderate or low incomes (Omar & Inaba, 2020). Microfinance is bringing banking to persons referred to as the unbalance i.e bringing credit, savings and other financial services to the reach of several persons who may be disadvantaged to be served by regular banks and this may be due to lack of sufficient or required collateral requested by commercial banks. The services of microfinance are tailored for the unemployed or low-income individual, this is as a result of prevailing poverty rate or persons with limited financial resources hence their inability to do business with the other financial institutions e.g. commercial banks (Cole & Akintola, 2021).

Basically, for the low-income earners and less privileged individuals the reach to bank loans and any other forms of financial assistance from financial institutions have been hard to come by this is because of the financial institution's fear of bad debts. Hence the foundation for micro finance banking is to enable these set of individuals access financial services such as micro loans, micro saving etc (Tafamel, 2019).

Ochonogor (2020) posits that the existence and operations of micro finance banks are beneficial to an economy. This is shown through the provision of financial opportunities to the improvised and those with low socio-economic backgrounds; also, through the encouraging of people to be

financially independent and making them financially resistant to combat unforeseen future expenses.

Mustapha Yusuf and Abdullahi (2019), posits that microfinance bank operations contributes considerably to poverty alteration and promotes financial market deepening. In developing countries with bad governance, microfinance banks are a useful strategy to fight down financial development barriers and it could help to pull down oppositions and build support for domestic financial reforms. Additionally, the argument that microfinance banks create avenues for skill acquisition, education and business development cannot be left out.

The problems that exist to stifle the operations of micro finance banks and its impact on the economic development in a country (Nigeria) is the near truancy of basic infrastructure; this factor increases the operational difficulties that already exists in providing financial services to consumers (Churchhill & Maristty, 2020).

The functional presence of the informal financial sector also compounds the problems to the efficiency of micro finance banks in Nigeria. The informal sector allows for the borrowing and lending of people directly amongst themselves which may be because of the low level of literacy, loss of confidence in the banking system etc (Umaru & Chibuzor, 2018).

One of the justification for the creation of micro finance banks was the lack of institutional capacity and weak capital base of the then existing community banks (Ocghonogor, 2020) and their inability to efficiently serve the unserved market and promote development in the economy; micro finance therefore in the bid to achieve this foundational objective is embattled with problems such as loan repayment issues, unavailability of adequate credit to given out to their customers, high operating cost of running a microfinance institution high risks of giving out loans, low technical skills and inexperienced credit staff and also the problem of illiteracy are all problems hindering the efficient impact of microfinance bank operations in economic development (Nwanna & Okeke, 2022).

Furthermore, just like Ayodele (2023) observed in his study, some macro-economic problems also place barriers / limitations on micro finance bank operations and they include galloping inflation rates, naira devaluations, volatility of the exchange and interest rates and the heavy transactions cost involved in giving out a loan.

It is therefore the major objective of this study to investigate the impact of microfinance bank operations on economic development (using Nigeria as a case study) in the midst of the aforementioned problems and also to establish the relationship between micro finance banks operations and economic development in Nigeria.

Conceptual Literature

Microfinance Bank and Economic development

In the area of this study, Nigeria, the place of microfinance banks in economic development is embedded in the objectives of microfinance banks operations. The roles include the promotion of rural development through financial intermediation, stimulating productive activities in the rural areas, developing banking habits in the rural dwellers and improving the capacity of small-scale businesses/producers in the rural and urban areas (Ifionu & Olieh, 2016).

The emphasis here is that microfinance banks were strategically designed to expand the financial sector of an economy and the productive capacity of individuals/groups so as to create development in the economy. Micro finance banks could be referred to as the cornerstone for the

promotion of economic development because their operations which include deposit mobilisation, credit delivery to finance micro enterprises, entrepreneurship development thereby stimulating employment and providing rural development through financial literacy and financial inclusion (Babarinde, Abdulmajeed, Angyu & Abu, 2021).

From the foregoing discourse, it can be perceived that microfinance banks play a major role in economic development through their operations of deposit mobilization and the promotion of a saving culture amongst the people, creating credit extensions to their various customer base, stimulating employment generation through the provision of skill acquisition programmes and entrepreneurship building (Oluka, Orga & Monanu, 2023).

Murad and Idewele (2017) observed that microfinance banks operations serve as a means to empower the poor and also provide an invaluable tool in the promotion of economic development process of any economy.

Empirical Review

Oluka, Orga and Monanu (2023) in a research work investigated micro finance banks as a catalyst for entrepreneurship development using Enugu North LGA as a case study. The finding from the use of Chi Square statistical tool revealed that micro finance bank savings services had a significant positive effect on the productivity of entrepreneurs in Enugu North LGA which transcends to economic development.

Nwanna and Okeke (2022) examined the relationship between microfinance credit and alleviation of poverty in Nigeria, the study covered a period of 2008 – 2019 and used unemployment rate, fixed capital formation and per capita income as poverty alleviation proxies, while micro finance credit was the dependent variable. The findings of the study revealed that there is a significant relationship between the dependent variable micro finance credit and each of the independent valuables unemployment rate, capita formation and per capita in Nigeria. The study therefore posited that micro finance credit has the capacity of reducing poverty rate and increasing development in Nigeria.

A long run relationship between micro financial inclusion and poverty in Nigeria from 1990-2018 was examined by Ngong, Thaddeus and Onwumere (2021) using Engle-Granger two-step co-integration and autoregressive distributed cag (ARDL) techniques. They designed a model where GDP per capita proxied poverty reduction as the dependent variable and micro financial inclusion was measured by borrowers from microfinance institutions, commercial bank loan to small scale business, broad money supply ratio, number of micro finance banks, and commercial bank branches. The finding from the research work revealed that micro financial inclusion and poverty alleviation converge to long run equilibrium and also that a long run relationship exists between micro finance banks inclusion and poverty alleviation.

Ochonogor (2020) examined the performance of Microfinance Institutions (MFIs) and its impact on economic development in Nigeria. Employing the error correction model technique, his findings from the co integration results established that there exists a long run equation; therefore, the OLS was used for the long-run analysis. The study found a positive relationship between human development index (which was proxy for economic development) and micro finance loans.

The nexus between microfinance banks and the growth of small and medium enterprises in Nigeria was studied by Akinadewo (2020). Through a self-administered questionnaire to respondents, the

study showed that a significant and positive relationship exists between the growth of micro, small and medium enterprises in Nigeria and microfinance banks.

Umaru and Chibuzo (2018) considered the possible relationship between financial inclusion and poverty alleviation. The results from the partial least square – structural equation modelling using simple random sampling technique showed that there exists a significant and positive effect of financial inclusion on poverty reduction.

Yahaya, Oni, Ishola, Gbedmosi and Odeseye (2018) in the study using Kwara State as a case study investigated the contribution of microfinance bank policy to rural development. The findings from their regression analysis presented a positive relationship between the adoption of microfinance banks, it's policy targets on improving savings culture, provision of employment opportunities and investment loans in the rural areas of Kwara State the relationship was found to be significant at 5% level.

Murad and Idewele (2017) employed multiple regressions analysis to examine the impact of micro – finance institution on economic growth using Nigeria as a case study; data used was cross sectional and time series in nature. The study after statistical analysis showed that micro finance bank loans have a significant and positive impact on the economic performance of Nigeria in the short-run.

More also Obayagbona (2018) empirically examined the impact of microfinance back on poverty alienation in Nigeria, using ordinary least square and correlation coefficient econometric technique for the empirical investigation, the study finds out that microfinance assets and loan-to-deposit ratio can be considered as one of the major determinations of poverty alleviation in Nigeria.

Model Specification and Methodology

Using secondary data sourced from Central Bank of Nigeria statistical Bulletin, World Bank data base; the study employed the Auto regressive Distributed lag regression technique to investigate the impact of microfinance bank operations on economic development (using Nigeria as a case study). Augmented Dickey- Fuller test equation was also carried out on the dependent and independent variables.

GDPPC = F (MFBD, MFBL, MFBI, MFBINTR)
Estimated as
$GDPPC = \beta_0 + \beta_1 MFBD + \beta_2 MFBL + \beta_3 MFBI + \beta_4 MFBINTR + U_t$
And ARDL equation specified as

$$logGDPPC_{it} = \propto_{10} + \sum_{k=1}^{n} \propto_{1\propto} \Delta logGDPPC_{it-\vartheta} + \sum_{k=1}^{n} \propto_{2\propto} \Delta logMFBD_{t-\vartheta} + \sum_{k=1}^{n}$$

$$\propto_{3\propto} \Delta logMFBL_{t-\vartheta} + \sum_{k=1}^{n} \propto_{4\propto} \Delta logMFBI_{t-\vartheta} + \sum_{k=1}^{n} \propto_{5\propto} \Delta logMFBINTR_{t-\vartheta} + \beta 6\text{MFB}D_{t-i} +$$

$$\beta 7 MFBL_{t-i} + \beta 8\text{M}FBI_{t-i} + \beta 9 MFBI_{t-i} + \beta 10 MFBINTR_{t-i} + \in_{2\text{it}}$$

GDPPC = Gross Domestic Product per Capita (proxy for economic development), MFBD = Micro Finance Bank Deposit, MFBL = Micro Finance Bank Loans, MFBI = Micro Finance Bank investments, MFBINTR = Micro Finance Bank Interest Rate

If there was evidence of co-integration among the variables, then the following long run model was estimated:

$$\Delta logGDPPC_{it} = \propto_0 + \sum_{\vartheta=1}^{n} \emptyset_{i\propto} \Delta logGDPPC_{it-\vartheta} + \sum_{i=0}^{n} \vartheta_{1\propto} \Delta logMFBD_{it-\vartheta} + \sum_{i=0}^{n}$$

$$\theta_{i\alpha} \Delta logMFBL_{it-\vartheta} + \sum_{i=0}^{n} \pi_{1\alpha} \Delta logMFBI_{t-\vartheta} + \sum_{i=0}^{n} \tau_{1\alpha} \Delta logMFBINTR_{it-\vartheta} + \in_{it}$$

The ARDL specification of the short run dynamics can be derived by constructing an error correction model of the form:

$$\Delta logGDPPC_{it} = \propto_2 + \sum_{\vartheta=1}^{n} \beta_{2\alpha} \Delta logGDPPC_{it-\vartheta} + \sum_{i=0}^{n} \gamma_{2\alpha} \Delta logMFBD_{it-\vartheta} + \sum_{i=0}^{n}$$

$$\delta_{2\alpha} \Delta logMFBL_{it-\vartheta} + \sum_{i=0}^{n} \omega_{2\alpha} \Delta logMFBI_{t-\vartheta} + \sum_{i=0}^{n} \sigma_{2\alpha} \Delta logMFBINTR_{it-\vartheta} + \varphi ECT_{it-\vartheta} + \in_{it}$$

Where ECt_{it} is the error correction term and is defined as

$$ECT_{it} = \Delta logGDPPC_{it-\vartheta} - \propto 1 - \sum_{\vartheta=1}^{n} \emptyset_{1\propto} \Delta logGDPPC_{it-\vartheta} - \sum_{i=0}^{n} \partial_{1\propto} \Delta logMFBD_{it-\vartheta} - \sum_{i=0}^{n}$$

$$\theta_{1\alpha} \Delta logMFBL_{it-\vartheta} - \sum_{i=0}^{n} \pi_{1\alpha} \Delta logMFBI_{t-\vartheta} - \sum_{i=0}^{n} \tau_{1\alpha} \Delta logMFBINTR_{it-\vartheta}$$

All coefficients of the short run equation are coefficient relating to the short run dynamics of the model's convergence to equilibrium and φ in equation above represents the speed of adjustments.

Data analysis

Descriptive statistics analysis

The study began this section by comprehensively comparing the descriptive statistics of the data set employed in this study. Table 1 showed the result of the descriptive or summary statistics for both dependent and independent variables. It is important to state that for the summary statistics, the raw data in their untransformed state were used to enable an appraisal of the structure of the raw data used for the regression analysis. The summary statistics were used to compare the measures of central tendency, the measures of dispersion and the measures of normality of the data set. The measures of central tendency compared the mean and median values of the data set. While the mean considered the average values of the variables the median looked at the middle distribution of the data set.

From the result, it could be observed that the mean values were: $1556.59 for gross domestic product per capita (GDPPC); ₦115.66billion for microfinance bank deposits (MFBD); ₦141.66billion for microfinance bank loans (MBFL); ₦3.85 billion for microfinance bank investment (MFNI); and 19.20 percent for microfinance bank interest rate (MFBINTR). The median values of the variables were: $1880.15 for gross domestic product per capita (GDPPC); ₦54.54billion for microfinance bank deposits (MFBD); ₦35.62billion for microfinance bank loans (MBFL); ₦3.52 billion for microfinance bank investment (MFNI); and 16.55 percent for microfinance bank interest rate (MFBINTR).

The measures of dispersion considered how widely spread the dataset was from their mean values. The measures of dispersion considered in this study were the minimum value, the maximum values and the standard deviation. From the E-view output, the maximum values were: $3201.00 for gross

domestic product per capita (GDPPC); ₦593.78billion for microfinance bank deposits (MFBD); ₦911.56billion for microfinance bank loans (MBFL); ₦9.01 billion for microfinance bank investment (MFNI); and 36.20 percent for microfinance bank interest rate (MFBINTR).

TABLE 1 Result of descriptive statistics

	GDPPC	MFBD	MFBL	MFBI	MFBINTR
Mean	1556.593	115.6893	141.6657	3.853000	19.20300
Median	1880.150	54.54000	35.62500	3.520000	16.55000
Maximum	3201.000	593.7800	911.5600	9.010000	36.20000
Minimum	270.0000	2.180000	0.650000	0.210000	12.00000
Std. Dev.	920.5288	151.5923	249.7464	3.122378	7.253375
Skewness	-0.014700	1.674258	2.221945	0.312405	0.962432
Kurtosis	1.595753	5.128992	6.894817	1.729689	2.589338
Jarque-Bera	2.465966	19.68146	43.64720	2.505097	4.842182
Probability	0.291422	0.000053	0.000000	0.285776	0.088825
Sum	46697.80	3470.680	4249.970	115.5900	576.0900
Sum Sq. Dev.	24573827	666426.5	1808824.	282.7280	1525.732
Observations	30	30	30	30	30

Source: Researcher's presentation from E-views 10.0 statistical software (2023)

The minimum values were: $270.00 for gross domestic product per capita (GDPPC); ₦2.18billion for microfinance bank deposits (MFBD); ₦0.65billion for microfinance bank loans (MBFL); ₦0.21 billion for microfinance bank investment (MFNI); and 12.00 percent for microfinance bank interest rate (MFBINTR). The standard deviation measures how far the observations are from their sampled averages. From the summary output, the standard deviation values were: $920.52 for gross domestic product per capita (GDPPC); ₦151.59billion for microfinance bank deposits (MFBD); ₦249.74billion for microfinance bank loans (MBFL); ₦3.12 billion for microfinance bank investment (MFNI); and 7.25 percent for microfinance bank interest rate (MFBINTR).

It is worthy of note that the measurement of normality measures whether the data set is normally distributed or otherwise. The measures of normality considered by this study were skewness and kurtosis. Skewness measured the degree of asymmetry of the series. The series may be normally skewed, positively skewed or negatively skewed. A skewness value of zero is said to be normal and implies that the distribution is symmetry around its mean; a positive skewed value implies that the distribution has a long right tail, implying that the skewness value is higher than the sampled mean. A negative skewness implies that the distribution has a long-left tail with lower values than the sampled mean. From the E-view result, the skewness values of $-0.01 for gross domestic product per capita (GDPPC); ₦0.31 billion for microfinance bank investment (MFNI); and 0.96 percent for microfinance bank interest rate (MFBINTR) respectively mirrored a negatively skewed distribution, implying that the distribution had a long-left tail with lower values than the sampled mean. On the other hand, the skewness values of ₦2.22billion for microfinance bank deposits (MFBD) and ₦1.67billion for microfinance bank loans (MBFL) respectively mirrored a positively skewed distribution, implying that the distribution for these variables have a long right tail with higher values than the sampled mean.

Kurtosis measures the peakedness or flatness of the data relative to the normal distribution. Kurtosis could be mesokurtic, leptokurtic or platykurtic. A kurtosis value of 3.0000 is mesokurtic, meaning that the distribution is normal. A kurtosis value greater 3.0000 is said to be leptokurtic or positive kurtosis, meaning that it has a peaked curve and produces higher values than the normal. A kurtosis value less 3.0000 is platykurtic or negative kurtosis, meaning that it has a flatted curve

and that it produced lower values than the sample mean. From the result obtained in Table 1 for the dataset, the kurtosis values of $1.59 for gross domestic product per capita (GDPPC); ₦1.72 billion for microfinance bank investment (MFNI); and 2.58 percent for microfinance bank interest rate (MFBINTR) respectively were less than 3.0000 required for a normal distribution. Hence, the data for these variables had flatted curve and produced lower values than the sample mean. On the other hand, the coefficients of the kurtosis of ₦5.12billion for microfinance bank deposits (MFBD) and ₦6.89billion for microfinance bank loans (MBFL)respectively were greater than 3.0000 required for normality. It, therefore, meant that this dataset was leptokurtic, meaning that they produced higher value than the normal.

The Jarque-Bera (JB) test measures the difference of the skewness and kurtosis of the series with those from the normal distribution. The null hypothesis for the JB statistics held that the series is normally distributed. Given the result in Table 1, the JB values of $2.46 for gross domestic product per capita (GDPPC); ₦2.50 billion for microfinance bank investment (MFNI); and 4.84 percent for microfinance bank interest rate (MFBINTR) with their respective p-values of 0.29, 0.28 and 0.08 percent greater than 0.05 meant that the null hypotheses for all the variables were not rejected. It, therefore, meant that the dataset was normally distributed.

The unit root test

The outcome of the unit root test based on the Augmented Dickey-Fuller (ADF) is reported in Table 2. The outcome of the test as reported in Table 2 revealed that no variable was found to be stationary at level. This is because the Augmented Dickey-Fuller (ADF) test statistics values calculated in absolute terms were less than their respective tabulated values at one, five and ten per cent level of significance. However, all the variables of interest that were not stationary at level because their computed ADF test statistics values were less than the critical ADF statistics values at the one, five and ten per cent level of significance, became stationary after the performance of first difference operation on them. Thus, at first difference, the computed ADF test statistics values for all the variables were greater than the tabulated values at five per cent level of significance. The variables were therefore integrated of the first order.

TABLE 2 Augmented Dickey-Fuller (ADF) test

Variables	At Level	At 1st or 2nd Difference	Order of integration
GDPPC	-2.527	-3.493	I(1)
MFBD	-0.656	-9.146	I(1)
MFBL	-0.542	-4.113	I(1)
MFBI	-1.151	-5.697	I(1)
MFBINTR	-1.734	-3.626	I(1)
TEST OF CRITICAL VALUES: 1%= -3.6891, 5%= -2.9718, 10%= -2.6251			

Source: Researcher's presentation from E-views 10.0 statistical software

ARDL bound testing approach

The ARDL approach to co-integration as first developed by Pesaran and Shin (1999) and Pesaran, Shin and Smith (2001) has been applied with the help of unrestricted vector error correction model. The ARDL technique has several advantages over the other co-integration methods. ARDL approach can be adopted irrespective of whether underlying variables are purely I(0), I(1) or mutually co-integrated. ARDL has estimated better small sample properties.

The bounds test approach of co-integration, as adopted by Pesarant et. al. (2001) was in order to determine if there is a long-run relationship between microfinance bank operation options (MFBD, MFBL, MBFI and MFBINTR) and gross domestic product per capita (GDPPC) in Nigeria.

Therefore, the F-test through the Wald test (bound test) is conducted to check how the joint significance of the coefficients specified in the model is. The Wald test is performed by imposing restrictions on the estimated long-run coefficients of microfinance bank operation options (MFBD, MFBL, MBFI and MFBINTR) and gross domestic product per capita (GDPPC) in Nigeria. From Table 3, ARDL bound test tabulated lower and upper bound are selected based on five per cent significance level. The result in the Table 3 revealed that the independent variables (MFBD, MFBL, MFBI and MFBINTR) are jointly co-integrated with the dependent variable, gross domestic product per capita (GDPPC) in Nigeria, hence, a long-run relationship exist.

TABLE 3 ARDL F-bounds Wald test analysis

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	5.859989	10%	2.2	3.09
K	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37
Actual Sample Size	26		Finite Sample: n=35	
		10%	2.46	3.46
		5%	2.947	4.088
		1%	4.093	5.532
			Finite Sample: n=30	
		10%	2.525	3.56
		5%	3.058	4.223
		1%	4.28	5.84

Source: E-views 10.0 statistical software

TABLE 4 ARDL long run form estimates

ARDL Long Run Form and Bounds Test				
Dependent Variable: D(LGDPPC)				
Levels Equation				
Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LMFBD	0.528602	0.151258	3.494700	0.0250
LMFBL	-0.453358	0.069839	-6.491483	0.0029
LMFBI	0.580295	0.176727	3.283576	0.0304
LMFBINTR	0.073559	0.327841	6.310594	0.8335
C	6.179940	0.979296		0.0032
EC = LGDPPC - (0.5286*LMFBD -0.4534*LMFBL + 0.5803*LMFBI + 0.0736				
*LMFBINTR + 6.1799)				

Source: E-views 10.0 statistical software

The calculated F-statistic is 5.85 was found to be greater than corresponding the ARDL lower (2.88) and upper (3.87) critical bound values. The value revealed that there is evidence of long-run co-integration between microfinance bank operation options (MFBD, MFBL, MBFI and MFBINTR) and gross domestic product per capita (GDPPC) in Nigeria.

ARDL co-integrating and long run form

With reference to the unit root test order of integrations 'I (0) and I (1)', this study seeks to confirm the assertion that there is a possibility of a long run co-integration between/among the variable of the same unique order of integrations. Based on the ARDL bound test result, it is concluded that there is a long run relationship among the variables in the model. Given the result in Table 4, there is a need to estimate the long-run coefficients. The long run coefficient measures the long run effect of the independent variables on the dependent variable.

From the ARDL co-integrating and long run form in Table 4, long run estimates showed that the independent variables (MFBD, MFBL, MFBI and MFBINTR) have a joint significant negative effect on gross domestic product per capita (GDPPC) in Nigeria in the long run. This means that the current trend of microfinance bank operation options (MFBD, MFBL, MBFI and MFBINTR) will have a significant negative effect on gross domestic product per capita (GDPPC) in Nigeria in the long run. All things being equal, GDPPC in Nigeria will decrease by 6.17 per cent as a result of the interaction within microfinance bank operation options in the long run, ceteris paribus. However, these findings are to some extent different from the findings of Babarinde, Abdulmajeed, Angyu and Abu (2021)

The ARDL long run estimates revealed that, all things being equal, a percentage increase in microfinance bank deposits (MFBD) will lead to a decrease in gross domestic product per capita (GDPPC) in Nigeria by 0.52 per cent and was found to be statistically significant at five percent in the long run; this is similar to the findings of Ifionu and Olieh (2016). On the other hand, the ARDL long run estimates revealed that, all things being equal, a percentage increase in microfinance bank loans(MFBL) will lead to an increase in gross domestic product per capita (GDPPC) in Nigeria by 0.45 per cent and was found to be statistically significant at five percent in the long run.

Further analysis of the ARDL long run estimates revealed that, all things being equal, a percentage increase in microfinance bank investment (MFBI) will lead to an increase in gross domestic product per capita (GDPPC) in Nigeria by 0.58 per cent and was found to be statistically significant at five percent in the long run. Lastly, the ARDL long run estimates revealed that, all things being equal, a percentage increase in microfinance bank interest rate (MFBINTR) will lead to a decrease in gross domestic product per capita (GDPPC) in Nigeria by 0.07 per cent and was found to be statistically non-significant at five percent in the long run. These findings agree with Tafamel (2019), Ugochukwu and Onochie (2017) and Apere (2016).

ARDL short run dynamics test

The ARDL short-run test shown in Table 5 revealed that the value of the intercept which is 6.70 revealed that gross domestic product per capita (GDPPC) in Nigeria led increase by a 6.70 per cent when all the independent variables (MFBD, MFBL, MFBI and MFBINTR) are held constant but was found to be statistically significant at five percent significance level. The analysis further revealed that the R^2 (R-squared) which measures the overall goodness of fit of the entire ARDL model has a very high good fit. This is represented with the R^2 value of 0.9984 (99.84 per cent), approximately 99 per cent. This indicates that the independent variables (MFBD, MFBL, MFBI and MFBINTR) accounted for about 99.84 per cent variation in the dependent variable (GDPPC).

Table 5 ARDL short run dynamic results

Dependent Variable: LGDPPC
Method: ARDL
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (4 lags, automatic): LMFBD LMFBL LMFBI LMFBINTR
Fixed regressors: C
Selected Model: ARDL(1, 4, 4, 4, 4)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LGDPPC(-1)	-0.085227	0.202554	-0.420760	0.6956
LMFBD	-0.042995	0.053148	-0.808967	0.4639
LMFBD(-1)	0.082424	0.062365	1.321640	0.2568
LMFBD(-2)	0.257498	0.060341	4.267408	0.0130
LMFBD(-3)	0.146647	0.078847	1.859883	0.1364
LMFBD(-4)	0.130079	0.079798	1.630111	0.1784
LMFBL	-0.192786	0.057080	-3.377437	0.0279
LMFBL(-1)	0.030435	0.073439	0.414417	0.6998
LMFBL(-2)	-0.263954	0.092289	-2.860101	0.0459
LMFBL(-3)	0.038757	0.068197	0.568305	0.6002
LMFBL(-4)	-0.104447	0.081157	-1.286970	0.2675
LMFBI	0.309753	0.117958	2.625971	0.0584
LMFBI(-1)	-0.066927	0.084889	-0.788409	0.4746
LMFBI(-2)	0.170874	0.109462	1.561040	0.1935
LMFBI(-3)	0.027295	0.076448	0.357039	0.7391
LMFBI(-4)	0.188757	0.119348	1.581566	0.1889
LMFBINTR	0.052083	0.094025	0.553928	0.6091
LMFBINTR(-1)	-1.156745	0.385107	-3.003699	0.0398
LMFBINTR(-2)	0.710884	0.345102	2.059923	0.1085
LMFBINTR(-3)	-0.201890	0.303386	-0.665454	0.5422
LMFBINTR(-4)	0.675495	0.346564	1.949119	0.1231
C	6.706635	1.535216	4.368530	0.0120

R-squared	0.998451	Mean dependent var	7.299356
Adjusted R-squared	0.990317	S.D. dependent var	0.637266
S.E. of regression	0.062707	Akaike info criterion	-2.880184
Sum squared resid	0.015729	Schwarz criterion	-1.815641
Log likelihood	59.44239	Hannan-Quinn criter.	-2.573634
F-statistic	122.7601	Durbin-Watson stat	3.155340
Prob(F-statistic)	0.000143		

*Note: p-values and any subsequent tests do not account for model selection.

Source: E-views 10.0 statistical software

In the same vein, the value of F-statistics (122.76) showed that the overall ARDL model is statistically significant. The overall significance of the ARDL short-run model implies the joint significance of all explanatory variables (MFBD, MFBL, MFBI and MFBINTR) in explaining the short-run changes in gross domestic product per capita (GDPPC) in Nigeria. The study done by Ochonogor (2020) also affirms the relationship between micro finance bank operations and economic development.

Further examination of the ARDL short-run estimates revealed that changes in the previous lagged period, the previous lagged three periods and the previous lagged four periods of microfinance bank deposits (MFBD) had a non-significant positive effect; while changes in the previous two

lagged periods of microfinance bank deposits (MFBD) had a significant positive effect; and the current period of microfinance bank deposits (MFBD) had a non-significant negative effect on gross domestic product per capita (GDPPC) in Nigeria in the short run. The implication is that, a percentage increase/decrease in microfinance bank deposits (MFBD) led to a corresponding increase/decrease in gross domestic product per capita in Nigeria in the short run, ceteris paribus. The ARDL short-run estimates further revealed that changes in the current period and the previous lagged two periods of microfinance bank loans (MFBL) had a significant negative effect; while changes in the previous lagged period and the previous lagged three periods of microfinance bank loans (MFBL) had a non-significant positive effect; and changes in the previous lagged four periods of microfinance bank loans (MFBL) had a non-significant negative effect on gross domestic product per capita (GDPPC) in Nigeria in the short run. The implication is that, a percentage increase/decrease in microfinance bank loans (MFBL) led to a corresponding increase/decrease in gross domestic product per capita in Nigeria in the short run, ceteris paribus. Nwanna and Okeke (2022) also had similar results in their study on micro finance credit and poverty alleviation in Nigeria.

The ARDL short-run estimates further revealed that changes in the previous lagged two periods, the previous lagged three periods and the previous lagged four periods of microfinance bank investments (MFBI) had a non-significant positive effect; while changes in the previous lagged period of microfinance bank investments (MFBI) had a non-significant negative effect; and changes in the current period of microfinance bank investments (MFBI) had a significant positive effect on gross domestic product per capita (GDPPC) in Nigeria in the short run. The implication is that, a percentage increase in microfinance bank investments (MFBI) led to a corresponding increase in gross domestic product per capita in Nigeria in the short run, ceteris paribus.

Lastly, the ARDL short-run estimates revealed that changes in the current period, the previous lagged two periods and the previous lagged four periods of microfinance bank interest rate (MFBINTR) had a non-significant positive effect; while changes in the previous lagged period of microfinance bank interest rate (MFBINTR) had a significant negative effect; and changes in the previous lagged three periods of microfinance bank interest rate (MFBINTR) had a non-significant negative effect on gross domestic product per capita (GDPPC) in Nigeria in the short run. The implication is that, a percentage increase in microfinance bank interest rate (MFBINTR) led to a corresponding increase in gross domestic product per capita in Nigeria in the short run, ceteris paribus. The findings from the short run analysis are similar to that of Ayodele (2023), Murad and Idewele (2017) and Ochonogor (2020).

Table 6 ARDL short run error correction term (ECT) result

ARDL Error Correction Regression

Dependent Variable: D(LGDPPC)

Selected Model: ARDL(1, 4, 4, 4, 4)

ECM Regression

Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LMFBD)	-0.042995	0.023592	-1.822402	0.1425
D(LMFBD(-1))	-0.534223	0.077242	-6.916194	0.0023
D(LMFBD(-2))	-0.276726	0.070522	-3.923955	0.0172
D(LMFBD(-3))	-0.130079	0.043268	-3.006363	0.0397
D(LMFBL)	-0.192786	0.031588	-6.103198	0.0036
D(LMFBL(-1))	0.329645	0.055164	5.975688	0.0039
D(LMFBL(-2))	0.065690	0.029735	2.209148	0.0917
D(LMFBL(-3))	0.104447	0.031871	3.277135	0.0306
D(LMFBI)	0.309753	0.034876	8.881559	0.0009
D(LMFBI(-1))	-0.386926	0.067380	-5.742426	0.0046
D(LMFBI(-2))	-0.216052	0.038544	-5.605338	0.0050
D(LMFBI(-3))	-0.188757	0.040636	-4.645016	0.0097
D(LMFBINTR)	0.052083	0.047437	1.097937	0.3339
D(LMFBINTR(-1))	-1.184490	0.157761	-7.508129	0.0017
D(LMFBINTR(-2))	-0.473606	0.155929	-3.037309	0.0385
D(LMFBINTR(-3))	-0.675495	0.125051	-5.401748	0.0057
CointEq(-1)*	-1.085227	0.122013	-8.894372	0.0009

Source: E-views 10.0 statistical software

ARDL error correction test

There are several requirements for the validity, consistency and efficiency of the error correction model methodology. However, one of it holds that, the existence of a long run relationship among the variables of interest requires the coefficient of the error correction term (ECT) to be negative and not lower than -2 (lies between 0 and -2). The ECT shows the speed of adjustment to restore equilibrium in the dynamic model. The ECT coefficient shows how quickly variables converge to equilibrium and it should have a statistically significant coefficient with a negative sign. The ECT tells the speed with which our model returns to equilibrium following an exogenous shock. It should be negatively signed, indicating a move back towards equilibrium; a positive sign indicates movement away from equilibrium.

Meanwhile, the error correction term factor has a negative sign and statistically significant as theoretically expected as shown in Table 6. The results of ECT indicate that there is both short- and long-run equilibrium in the system. The coefficient of one period lag residual coefficient is negative and significant which represents the long-run equilibrium. The coefficient (CointEq(-1) is -1.0852 meaning that the system could correct its previous period disequilibrium at a speed of

108.52 per cent annually. This is considered a move towards the equilibrium at an extraordinary high speed of adjustment.

CUSUM stability test

The essence of this is to determine the stability of the model using the CUSUM stability test analysis. The CUSUM stability test condition holds that, the middle line (trend) must not lie outside the set-region, bordered by two slant lines. From our analysis, the CUSUM stability test in Fig. 1 revealed that this condition has been met satisfactorily, hence, it is concluded that, the ARDL model is stable or has stability at five per cent level of significance.

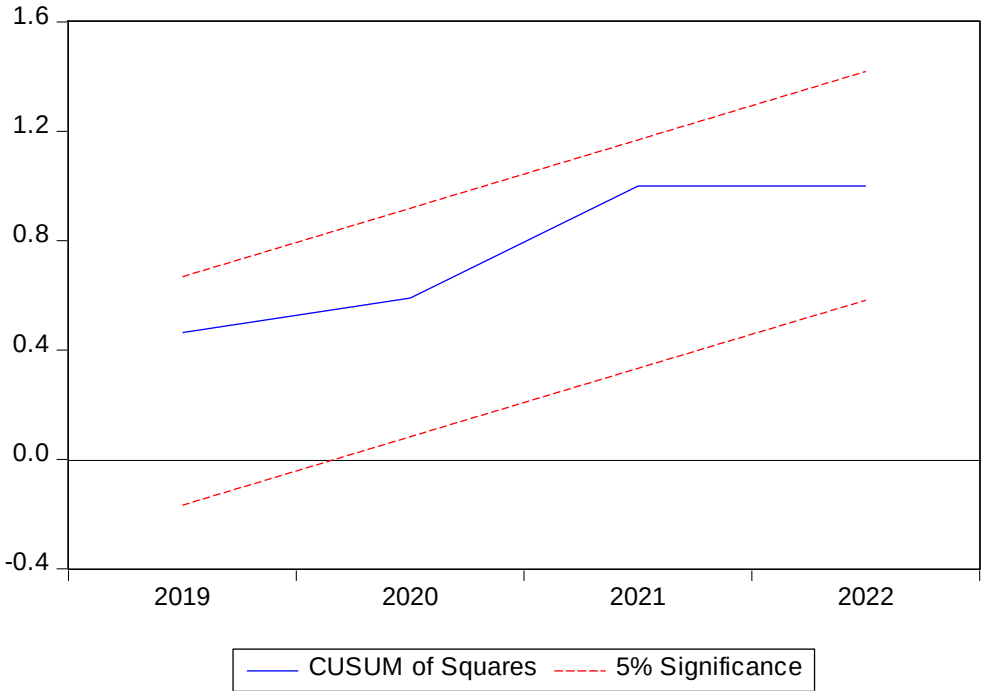

FIG. 1: CUSUM Stability test

Source: E-view 10.0 econometric software

Conclusion

The role of micro finance bank operations in economic development cannot be overemphasised. From the preceding findings it is believed that the factors adduced as micro finance bank operations (Micro Finance Bank Deposit, Micro Finance Bank Loans, Micro Finance Bank investments and Micro Finance Bank Interest Rate) are directly and indirectly responsible for the development of the Nigerian economy. The results also reveal amongst others that the micro finance bank operations have no significant impact on the gross domestic product per capita of Nigeria in the short run as should be theoretically expected.

Recommendations

The study therefore makes the following recommendations

i. Microfinance banks should lighten its lending conditions; increase its credit to the productive sectors of the economy so as to enhance productivity, which will in turn lead to increased economic growth and development.

ii. The government should initiate more policies to strengthen the micro finance banks through increased funding and capacity building to enhance access to credit, encourage banking habits among the rural dwellers, ensure even rural development and growth of small businesses, and therefore, enhanced deposits mobilization.

iii. In addition, Government should create enabling backgrounds and programmes that are capable of stimulating economic development through micro finance bank operations

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