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RESEARCH ARTICLE

Efficiency of Microfinance Banks and Performance of Micro, Small and Medium Enterprises in South-West Nigeria

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Abstract

The study examines the relationship between the efficiency of microfinance banks and performance of Micro, Small and Medium Enterprises (MSMEs) in South-West Nigeria during the first six years period of the commencement from 2012 to 2017 of regulatory reforms. Using panel vector autoregressive (PVAR) approach and Granger causality test, it is found that the present level of efficiency of microfinance banks has an insignificant impact on the performance of MSMEs, suggesting a negligible role in the activities of MSMEs. Put differently, the efficiency of microfinance banks does not significantly influence the performance of MSMEs. Further evidence indicates that no direction of causality found to be existing between the efficiency of microfinance banks and performance of the MSMEs. Put differently, past efficiency level of microfinance banks could not explain the present level of performance of small businesses (PSB) and vice versa, suggesting that low level of efficiency of microfinance banks contributes to the poor performance of MSMEs. It is therefore suggested that microfinance banks should adopt a suitable lending methodology such as proprietary lending technology and effective risk-based supervision to address the problem of high credit risks associated with business lending. Policy makers should also promote financial inclusion strategy and agent banking relationship more effectively.

Keywords: Microfinance Bank, Micro, Small and Medium Enterprises (MSMEs), Efficiency, Business Performance, Nigeria.

JEL Classifications: G21, L25, H21, L26.

1. Introduction

The dynamic role of Micro, Small and Medium Enterprises (MSMEs) as an engine of economic growth and development is well documented in the literatures. It is acknowledged in virtually every nation of the world that MSMEs are indispensable for sustainable economic development regardless of the economic system being adopted and the level of development attained by such an economy (Sanusi, 2013). Micro, Small and Medium Enterprises is of particular relevance in developing economies like Nigeria, because of its potential and catalytic role of increasing employment generation, expanding output, ensuring the development of indigenous technology, promoting entrepreneurial development and ultimately leading to the growth of Gross Domestic Product (GDP) which is a measure of how well an economy is performing (Okun, 1962; Lee, 2000; Viren, 2001; Akinyele, Oloba and Mah, 2022) though there are some views that found otherwise emphasizing that growth may not bring a performance of labour market outcomes (Keller and Nabil, 2002; Akinyele, Oloba and Mah, 2022). In realization of the significance of MSMEs and the problems confronting their performance, a great number of policy actions have been initiated by successive governments in Nigeria. However, the problems confronting these MSMEs are yet to be overcome. Prominent among these problems

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is the lack of access to credit in different forms from the financial market to finance their productive investment (Babajide, Lawal, Somoye and Nwanji, 2018).

Microfinance can be regarded as the availability of a large spectrum of financial and non-financial services in an efficient and affordable manner to low-income groups, individual and entrepreneurs that do not have access to conventional financial system (Consultative Group Against the Poor (CGAP), 2009). Services offer include microcredit, saving, payment systems, insurance, pension, and other non-financial services such as business advisory services, entrepreneur development services, and market linkage services. The distinguishing features between microfinance banks and conventional financial institutions are the smallness of loan size, simplicity of their operations, and acceptance of alternative collateral in the course of extending credit (Acha, 2012). While in general economic term, efficiency is the level of performance that describes using the lowest amount of inputs to achieve the highest level of output (Jhingan, 2003). Within the context of this study, therefore, the efficiency of microfinance banks revolves around outreach expansion and financial sustainability which are determined by resource utilization and ability of the banks. Under such situation, a high level of penetration is attained with suitable product development and more credits are consequently granted at the cheapest possible cost.

Performance of MSMEs is regarded for empirical analysis in this study, from banking perspective as a situation where entrepreneurial organizations can improve their turnover through increased asset and more labour engagement (resulting from financial support), in line with acceptable standard relating to the respective category of the MSMEs under consideration (Sharif, 2018). It could therefore be conceptualized that efficient microfinance banks would improve the utilization of its capital, ensure quality manpower, make effective use of fund mobilized and attain high penetration with suitable product development. These activities would result in improved turnover, increased asset as well as employment generation capacity of MSMEs. Such improved performance of MSMEs is brought about by effective penetration strategy and suitable credit appraisal technology employed by the microfinance banks, thereby leading to the development of the microfinance banking industry in Nigeria.

The continued assessment of MSMEs performance in the literature has lent credence to the significance of MSMEs as an indispensable instrument for sustainable economic development. But it has generated a great concern that despite the acclaimed relevance of the MSMEs in the economy, MSMEs subsector is not adequately accommodated by the financial market to perform its expected role due to the low efficiency level of financial institutions (Babajide, Lawal, Somoye and Nwanji, 2018). In addition, extant literature has provided several studies on the efficiency of financial system in Nigeria and other countries but concentrate mainly on commercial banks despite the significant role of financial intermediation played by MFBs (Ayade, Adebayo and Omolehinwa, 1998; Ajisafe and Ajide, 2014; Bolarinwa, Ogundana and Anjola, 2018; Bolarinwa, Akinyele and Vo, 2021). Few studies undertaken on MFIs are mainly from Asia, North and East Africa, Europe, Latin, and North Africa except Olasupo, Afolami, and Shittu (2014) that evaluated the performance of MFBs in Nigeria from the perspective of outreach expansion and financial sustainability using Data Envelop Analysis (DEA) in the agriculture sector only. Being the largest economy in Africa, with estimated $375b GDP, as at 2017 (National Bureau of Statistics (NBS), 2018), a comprehensive study covering all other sectors such as trading, artisan, manufacturing, and services under microfinance programs in the context of Nigeria's economy is most desirable. Thus, to address this issue, the present study adopts Stochastic Frontier Analysis (SFA) which independently represents the separation of noisy effect from the inefficient term as a measure of the efficiency level of banks.

The significance of this study, therefore, lies in the fact that an empirical study on the effect of efficiency of microfinance bank on MSMEs during the first six years' period of commencement from 2012 to 2017 of regulatory reforms has not been adequately explored. These regulatory reforms include; Risk-Based Supervision, National Financial Inclusion strategy including financial literacy and consumer protection, agent banking relationship and most importantly, Central Bank of Nigeria (CBN) MSME fund intervention programs in Nigeria. The study specifically focuses on the microfinance banks in the six states in Southwestern Nigeria (Lagos, Ogun, Oyo, Osun, Ondo and Ekiti State) as well as entrepreneurs patronizing the microfinance banks in the six states particularly those that have applied for government intervention loan.

The study's major contribution is the broader view it gives to the impact of microfinance banks as a channel for the empowerment of Micro, Small and Medium Enterprises. While most extant studies restricted themselves to evaluating the impact of microfinance bank on promoting MSMEs from demand side only, this study goes ahead to find out the impact of the efficiency of microfinance bank on the performance of MSMEs. It will also cover how an efficiently performing industrial subsector will enhance the efficiency of microfinance banks dwelling on issues bordering the demand and supply perspectives.

2. Literature Review

It has been ascertained that when a bank provides credit at the cheapest possible cost, there will be economic growth and development (Schumpeter,1934). This is based on the proposition that when business owners innovatively introduced corporate strategies in an entrepreneurial manner, there will be output expansion and economic development. In support of this theoretical foundation, Bertocco (2003) explained the role of financial institutions in nurturing MSMEs. Meyer (1997) also emphasized that banking relationship is significant because banks can efficiently secure useful information from a firm, business in the course of their interaction, and thus utilize this information in their pricing and decisions. The financial situation of MSMEs is usually rather cloudy to investors and thze cost of issuing securities directly to the public is too exorbitant for small enterprises. Hence, in the absence of financial intermediaries like banks, it will be somewhat difficult for most investors to acquire the necessary information to provide capital and equally too costly for small enterprises to raise capital itself. This has made the study on the efficiency of microfinance banks and MSMEs performance becomes more central.

According to Adebiyi, Banjo, and Regin, (2017), findings indicated that relationship exist between MSMEs' finance and business performance though concluded with limited information on loan qualification criteria and high-interest rates as a challenge to MSMEs in their quest to access finance. These authors also argued that there is significant relationship between financial management practices and the performance of SMEs. Following Beg (2016), microfinance institutions intended to improve business performance by empowering micro-entrepreneurs. The author finding presented the significant and positive relationship between loan and shareholders fund at 10% level of significance utilizing dataset of 245 microfinance Institutions. The effect of prudential supervision, outreach expansion is positive in favour of small-scale entrepreneurs. Their findings show that highly capitalized do not exploit the economics of scale advantage. Bolarinwa, Akinyele and Vo (2021) examines the intertemporal relationship between nonperforming loans, efficiency and bank recapitalization in the Nigerian banking industry between 2011 and 2018. Using system generalized method of moments (SGMM) and stochastic frontier analysis (SFA), the study documents the importance of bank efficiency for addressing escalating nonperforming loans in the industry after recapitalization policies and the channels pass-through between efficiency and the nonperforming loans-recapitalization nexus. Gebremichael and Hailemichael (2016) assessed the technical efficiency of 134 African Microfinance Institute (MFIs) and analyze if efficiency is influenced by ownership structure. The paper applies stochastic frontiers Analysis (SFA) on 134 microfinance banks (MFBs) operating in 36 African. MFBs are found to be wasteful. Non-governmental organization (NGO) and non-bank financial institutes are generally progressively productive. Indeed, the contribution of finance on the business performance of small businesses in the world remained significant and imperative.

Akinyele, Oloba and Mah (2022) revealed that the single output-multiple inputs framework indicates that on average, there is a low level of government efficiency towards increasing the objective of human development in Africa and as such accentuates infrastructure bottleneck that will enhance growth of MSMEs. Alnaa and Ahiakpor (2015) through survey data attempted to evaluate the strategy which microfinance can employ to increase output among poor micro-entrepreneurs in the Upper East Region of Ghana. Information gathered from 500 ladies engaged in agro-processing out of whom 250 were recipients of microfinance service. The outcome of the OLS method indicated that an improvement in the technical efficiency of microfinance recipients will positively affect output growth. While examining the efficiency of 15 microfinance institutions (MFIs) in Bangladesh, Azad, Masum, Munisamy, and Sharmin (2015) Azad, Masum, Munisamy, and Sharmin (2015) used Malmquist record (MI) over the period 2008–2012. With a balanced data panel of 75 respondents, the outcomes from MI are segregated into three efficiency ranges incorporating technical,

scale and pure efficiency, scale productivity (SE), and pure efficiency (PE). The experimental discoveries demonstrate that MFIs encountered a great yearly technical efficiency of (93.5 %) which was essentially a direct result of PE (Pure Efficiency). Das and Ghosh (2006) also expanded the scope on efficiency level between 1992 and 2002, the findings shows that there is higher level of inefficiency among Indian commercial banks in comparison to Ataullah, Cockeril and Le (2004) findings that provided with high level of efficiency scores in the post-reforms. In the second estimation stage, determinants of bank efficiency were established. The result indicated that bank size, ownership, capital adequacy ratio, nonperforming loans, and management quality have a significant effect on efficiency level though this was achieved through the use of multivariate analysis.

A paper by Loukoianova (2008) used the DEA approach to analyze Japanese banks technical efficiency in relation to banks from other developed countries for 2001. The author discoveries suggest that in terms of cost and income, City and Trust banks has the highest mean score compare to the provincial banks. It is also found out that in terms of technical efficiency, banks in Japan are less efficient when compared with those from the developed world. In a similar study, Pasiouras (2008) utilized the DEA method to deal with the survey on the efficiency of the Greek business banking sector between 2000 and 2004. Findings of the study suggest that banks that work abroad are more efficient than those that operate within the nations. In addition, while incorporating the determinants of efficiency, the advanced and professional Tobit investigation was adopted. Results show that higher capitalization and credit movement increases Greek business banks ' efficiency.

When credit facilities are granted to operators of MSMEs, there is the need to support such loan disbursement with associated complementary services such as business advisory, market linkage and entrepreneur development services to ensure that such fund is efficiently utilized on the desired purpose and not diverted (Ikechucku and Elizabeth, 2019). Experience shows that most owners of MSMEs consider these ancillary services as being of very limited relevance to the efficient utilization of the fund being disbursed to them. Basic financial training should be made compulsory before such funds are disbursed. However, despite many studies at different points in time on the impact of microfinance banks on the performance of MSMEs, the effect of efficiency of microfinance banks on the performance of MSMEs in Nigeria has remained largely unexplored. Most studies concentrate on funding for commercial banks and the growth of small and medium-sized enterprises (Dauda and Makinde, 2014), the effect of microfinance on small businesses (Ashamu, 2014), the impact of SME financing on economic development (Taiwo, Falohunand Agwu, 2016), among others. In addition, it is clear that the theoretical and empirical arguments advanced concerning defects in the evaluation of the efficiency of microfinance banks, and most importantly the useful lessons it offers particularly to managers and policymakers on microfinance as a tool that can help expand output constitute research gaps. The need to appraise the potency of the efficiency of MFBs on the performance of MSMEs is therefore important mainly in Nigeria's context.

3. Methodology

3.1 Theoretical Framework

The theoretical background of this study is the Schumpeter theory of Economic Development. This is because the theory holds the proposition that when financial institutions provide banking related services efficiently to MSMEs that adopt entrepreneurial skills through the application of effective corporate strategies, there will be output expansion from MSMEs. And by extension an attainment of economic development, particularly in a mixed economy in the context of Nigeria. Schumpeter (1934) also agreed with the demand following hypothesis owing to microfinance banks are seen in semi-urban areas where we have the demand for banking services. Hence, microfinance banks will be effective in promoting MSMEs since they are demand-driven and not supply-driven. Imai, Arun, and Anni (2010), in their study in India on microfinance and MSME growth, found out that semi-urban dwellers use microfinance services more productively and efficiently than their urban counterparts.

Essentially, in the theoretical literature, Schumpeter (1934) contended that efficient financial sector can assist in expanding output through the provision of credit, coupled with other non-financial services to the MSMEs which ultimately expand income level through investment in productive ventures and indirectly its growth particularly in the face of inadequacies and distortion that permeate the financial and labour market in the Nigerian economy. Schumpeter is the

only theory of financial development and industrial growth that gives a comprehensive explanation of the direct and indirect linkage effect of efficient financial sector and development of MSMEs. In tandem with the Schumpeter theory of economic development, it is clearly assumed that a certain proportion of firms' profitability are channeled into innovative activities and ploughing back into capital growth. This entrepreneurship activity ensures continuous improvements and growth of business activities. Hence, Schumpeter submitted that existence of functional financial system and entrepreneurship is the necessary and sufficient condition for economic development.

From theory and empirical studies, it has been argued that access to financial services leads to poverty reduction, a decrease in the level of inequality, enhance private investment and economic growth (Bruhn and Love 2014; Allen, Demirghiv, Kunt, Klapper, Martinez and Peria, 2012). Efficient financial institution enhances the allocation of resources productivity, significantly improve the effective routine management of finance, promote an inclusive financial system for all and stifle the growth of exploitative sources of credit such as private money lenders (Sarma, 2012). This could therefore result in enhancing performance of micro, small and medium enterprises (MSMEs) and in turn, performing MSME would improve the efficiency of the microfinance banks through patronage.

3.2 Estimation Procedures and Model Specification

This research examined the relationship between the efficiency of microfinance banks and the performance of MSMEs in Nigeria. The scope of the study covers eighteen senatorial districts of six states making up the Southwestern geopolitical zone in Nigeria. Specifically, microfinance banks in Lagos, Ogun, Oyo, Osun, Ondo and Ekiti State as well as entrepreneurs patronizing the microfinance banks in the six states particularly those that have applied for government intervention loan. According to CBN (2019), there are 898 microfinance banks in Nigeria as of February 2019. These Microfinance banks are listed as fully licensed banks (569) and those with the provisional license (329). Out of this total, Southwestern among other geo-political zones accounted for the lion share of 40% translating to 359 microfinance banks with 180 in the final license category while 179 have a provisional license.

This research work adopted a purposive sampling technique to select the sample for the multi-level sampling method. The choice of research design employed on the first level is the archival and documentary research strategy associated with the deductive approach used for descriptive research purposes (Saunder 2009). The Sampling focus is on two stages with the microfinance banks in the first stage while their entrepreneur customers constitute the second stage. In the first stage, the microfinance banks are purposively selected from each senatorial district in each of the six states taking into consideration customer base, capitalization level, balance sheet size, and nature of the product. The location of the microfinance banks in each senatorial district was also purposively selected just as the volume of their microfinance activities was also predetermined from their business review reports. The sample size of eighteen microfinance banks chosen represents about 10% of the population of licensed microfinance banks in South-West Nigeria. In the second stage, a total MSMEs population comprising of 14,800,000 representing 40% of the 37,000,000 number of total MSMEs in Nigeria (National Bureau of Statistics (NBS), 2018) located in the eighteen senatorial districts in Southwestern states were considered for the study. Krejcie and Morgan (1970) recommendation was adopted for sampling technique which emphasis the use of 384 as a minimum allowable sample if the population is 1,000,000 and above. A total sample of 1000 microfinance bank entrepreneurs from the eighteen senatorial districts in South West Nigeria was selected for this study because of the existing statistics that there is a total number of 36,770 business owners who applied for the intervention loan (NBS, 2018).

The questionnaire administered was structured to access information on government intervention loans and the performance of MSMEs. It was constructed in a way that extracted adequate and detailed information about the activities of business owners who are clients of the microfinance banks and also applied for the government intervention loan. A total of 1000 questionnaires were administered among MSMEs in Southwestern Nigeria, 988 questionnaires were returned which contain detailed information used for the study representing about 98% responses rate. The instrument is made up of both closed and open-ended items. The open-ended items bring details information from the respondents while responses to the closed-ended items may demand that researcher seek confirmation from other sources to make effective use

of the data. The instrument elicits information on the personal data of the respondent, like the age, marital status, type of employment, number of staff, account operations, etc. The questionnaire was distributed directly to the respondents and immediately received answers. This ensured a high response rate for analysis and result presentation.

3.2.1 Stochastic Frontier Analysis (SFA)

To generate our efficiency scores, the study adopts Stochastic Frontier Analysis (SFA) introduced into empirical literature by Aigner et al. (1977); and Meeusen & Van den Broek, (1977). Against the basic proposition of neoclassical production theory of full efficiency of firms, the SFA methodology aims at estimating the underlying inherent and unobservable inefficiency in the firm's production technology of cost, revenue, profit, production, and distance function while simultaneously accounting for random shocks (Kumbhakar, Wang and Homecastle, 2015). The SFA approach is expressed in a functional form and separate technical inefficiency from error term unlike the non-parametric methods of Data Envelope Analysis (DEA) and Free Disposal Hall.

The empirical model is specified as:

$$y_i = x_i'\beta + v_i - u_i = x_i'\beta + \varepsilon_i$$

$$for\ i = 1, \ldots, n \text{ ---------- } (1)$$

where y is a scalar output, $x'$is a k × 1 vector of covariates, β is a k × 1 vector of parameters, ε is noise, and represents technical inefficiency. In the empirical literature, it is standard to assume that vi~i.i.d. N(0, σ_v^2) and is independently and identically distributed as half-normal (Aigner et al., 1977), exponential (Meeusen& Van den Broeck, 1977), truncated normal (Stevenson, 1980) or gamma (Greene, 1990). In linear form, equation (2) can be written as:

$$ln\ y_i = \alpha_0 + \beta\ lin\ x_i + v_i - u_i \quad (2)$$

$$y_i = (\alpha_0 + \beta\ lin\ x_i + v_i - u_i) \quad (3)$$

Equation (3) can be rewritten as:

$$y_i = (\alpha_0 + \beta\ lin\ x_i)\ x\ exp(v_i)\ exp\ (u_i) \quad (4)$$

Where (α_0 + β lin x_i) is the deterministic component and the composite error term, i is decomposed into noise effect (υ_i) and inefficiency parameter (u_i). Alternatively, technical efficiency is expressed as the ratio of observed output to the corresponding stochastic frontier output:

$$TE_i = \frac{y_i}{exp(x_i'\beta + v_i)} = \frac{\exp(x_i'\beta + v_i - u_i)}{\exp(x_i'\beta + v_i)} = \exp(-u_i) \quad (5)$$

Technical efficiency (TE) scores range between 0 and 1. By implication, this measures the cost efficiency of bank i-thin relation to the minimum cost that could be incurred by a fully-cost efficient bank in the industry using the same input vector (Coelli, Prasada Rao, O'Donnell & Battese, 2005). Hence, the efficiency scores of banks produced are relative as the efficiency of a microfinance bank is measured in comparison to that of the most cost-efficient bank in the Nigerian banking industry. In particular, this work adopts the Battese and Coelli (1992) truncated normal random time-varying specification of a stochastic frontier production function for the unbalanced panel. The model is specified as:

$$Y_{it} = X_{it}'\beta + (V_{it} - U_{it}), \quad for\ i = 1, \ldots, N, t = 1, \ldots T \quad (6)$$

where Y_{it} is the logarithm of total loans and advances of the i-th bank in the t-th time period of a scalar output, X_{it} is a k×1vector of (transformations of the) input quantities (staff cost over staff strength, fixed asset over depreciation and deposit liability over their average respective cost) of the i-th firm in the t-th time period; β is a vector of unknown parameters; V_{it} is noise and u_{it} represents technical inefficiency. After the likelihood ratio (LR) test was carried out for the adequate specification to be adopted, the truncated time-varying specification was found to be adequate, hence, its application. Also, two approaches are recommended in the banking literature to identifying inputs and output. The intermediation method acknowledges the bank collecting deposits to convert them into loans using labour and capital. The approach to production recognizes the bank as a production unit that employs labour and capital to generate deposits and loans. Since this work centres on bank lending to the real sector, hence, it employs the intermediation approach.

In stochastic frontier analysis (SFA), the highly performing banks are arranged from poorly performing ones to best performing banks using the resulting efficiency score. Though, this arrangement can be achieved through the use of parametric or non-parametric frontier analysis to banks within the microfinance subsector. The parametric approach includes Stochastic Frontier Analysis, Tick Frontier and the Distribution Free Approach (DFA) while the non-parametric method is Data Envelopment Analysis (DEA) and the Free Disposal Hull (Molyneux, Altunbaş, Gardener and Moore, 2001). These two

sophisticated methods attempt to benchmark the relative performance of firms but the methods differ from each other owing to their respective underlying assumptions.

3.2.2 Panel Vector Autoregressive (PVAR)

Given that variables in the model could be endogenous, specifying the model within a dynamic framework is necessary. Hence, granger causality approach within Panel Vector Autoregressive (PVAR) introduced by Abrigo & Love (2015) is adopted. Given a k-variate homogeneous PVAR of order p with panel-specific fixed effects represented by the following set of equations following Abrigo and Love (2015):

$$B_0 Y_{it} = B_1 Y_{it-1} + \cdots + B_p Y_{it-p} + \varepsilon \quad (7)$$

Where Y_{it}= [ΔEFF, ΔPSB, ΔLIQDL] vector of K= 3 variables. B_0 is an invertible (*nxn*) matrix of the coefficient of contemporaneous relations on the endogenous variable; B_1 are (*nxn*) matrices capture the dynamic interaction between the K variables in the model, $_t$ denotes a mean zero (*nxn*) vector of the panel error term. Also, referred to as panel innovation or shocks and p is the number of lags. Equivalently, the model can be written more compactly as

$$B(l)Y_{it} = \varepsilon \quad (8)$$

Where $(l) = B_0 - B_1 l + B_2 l^2 + \ldots + B_p l^p$ is the autoregressive lag order polynomial. The variance-covariance matrix of the panel error term is typically normalized such that;

$$E(\varepsilon\varepsilon) = \varepsilon = I_k \quad (9)$$

To allow estimation of the PVAR model, we first need to derive its reduced form representation (since the model is not observable). This involves expressing Y_{it} as a function of its lags. To derive the reduce form representation, we pre-multiply both sides of the PVAR representation by B_0-1 Hence, we have

$$B0-1B0Yit = B0-1(B1Yit-1 + \cdots + BpYit-p) \quad (10)$$

3.3 Data Collection and Source of Data

This study employs the data of 18 microfinance banks operating in the southwestern state between 2010 and 2017. Both secondary and primary data were put to use in this study. The primary data was sourced with the use of questionnaires instrument with necessary modification and carried out by well-trained staff in the study area covering the six states making up the South-West region in Nigeria. The questionnaire provides detail information on microfinance bank entrepreneurs. It contains a large set of questions regarding the account ownership and usage individual characteristics including income, gender, credit rating, type of employment, relationship with south-west state and education were used for the estimation in this study. Secondary data was collected from the archive of the microfinance banks surveyed as well as the records of individual small business owners being study. Also, data were sourced from the Government publications (NBS) and publication of CBN, and World Bank reports. The full details of the data employed is presented in Table 1 and 2.

Table 1. *Output and Input Variables*

Variables	Description	Expectation	Measurement
Output	Total loan and advances	-	Loan and advances to customers
Input 1	Price of labor (pLAB)	Negative	The ratio of staff strength (number of employee) to staff cost.
Input 2	Price of capital (pCAP)	Positive	The ratio of total fixed asset to depreciation
Input 3	Price of borrowed fund and deposit (pBOR)	Negative	The ratio of deposit liabilities to interest expenses.

Table 2. *Data Measurements and Data Sources*

Variables	Measurements	A Priori Expectation	Source
Performance of MSMEs (PSB)	The average of credit and debit movement in the account of the business owners		Entrepreneurs account operations with the bank
Efficiency level (EFF)	This is derived from the Efficiency model.	Positive	Calculation from SFA
Independent Variables			

Size (SIZE)	Logarithm of Total Assets	Positive	Microfinance Bank Annual Reports
Organic Growth (ORGGROWTH)	This is the addition of reserves	Positive	Microfinance Bank Annual Reports
Capitalization (CAPSIZE)	This is the minimum capital requirement approved by the Central Bank of Nigeria for a relevant category of microfinance banks representing shareholder fund unimpaired by losses.	Positive	Microfinance Bank Annual Reports
Portfolio at Risk (CRISK)	This is defined as the ratio of non- performing loan to total loan assets.	Negative	Microfinance Bank Annual Reports
Liquidity (LIQD)	This measures the ratio of liquid assets as a proportion of total deposit liability.	Positive	Microfinance Bank Annual Reports

4. Empirical Results and Discussion

4.1 Unit Root Test

The literature has established that using non-stationary data in regression analysis could result in spurious estimates. This necessitates the need to carry out the stationary test. To understand the order of integration of our variables in their stationary form, this study carried out the Levin Lin-Chu (LLC), Im-Peseran-Shin (IPS), Augmented Dickey-Fuller- Fisher (ADF) and Philip Perron-Fisher (PP) unit root tests. These tests all have a null hypothesis that there is unit root. While LLC assumes that there is balance panel dataset and common unit root processes among cross-sectional units, IPS, ADF and PP assume that there is unbalance panel dataset and individual unit root processes across cross-sectional units. Based on the tests, there are presence of both I(0) and I(1) variables in the model as indicated in Table 3. It could be seen that all of the variables are on the borderline between the orders of integration I(0)/I(1), but that in first differences, all variables are stationary. The results revealed that the null hypothesis of the existence of a unit root can be rejected for most of the data series at 5% significant level using LLC, IPS, ADF and PP tests.

Table 3. *Result of Panel Unit-Root Test*

Variables	Lag	LLC	R	IPS	R	ADF	R	PP	R
CRISK	1	-2.460***	I(0)	-53.71***	I(0)	99.92***	I(0)	67.42***	I(0)
PSB	1	-13.66***	I(0)	-5.1271		3.781		53.02**	I(0)
ΔPSB	1	-		-1.3412*	I(1)	52.78**	I(1)	-	
EFF	1	-7.698***	I(0)	-1.466*	I(0)	54.51**	I(0)	57.86**	I(0)
CAP	1	-2.999***	I(0)	-1.3E+e15***	I(0)	47.49*	I(0)	68.49***	I(0)
LIQD	1	-3.289***	I(0)	-1.428*	I(0)	69.68***	I(0)	54.20**	I(0)
ORG	1	-1.248***	I(0)	-1.1E+e14***	I(0)	83.51***	I(0)	69.60***	I(0)
SIZE	1	-9176***	I(0)	-1.625***	I(0)	86.73***	I(0)	47.79*	I(0)

Notes: ****, **, and * represent significance at 1%, 5%, and 10% respectively; where R is the remarks for the order of integration.*

Source: *Authors' computation (2021)*

4.2 Lag Length Selection Criteria

Before the estimation of the models, the lag order selection statistics is also considered. It is necessary to determine the optimum lag length given that the panel vector autoregressive (PVAR) approach reacts to the number of lags included in its estimation. The selected lag length is lag 1 based on the outcome of Bayesian information criterion (MBIC) and Akaike information criteria (MQIC) because they minimize the information criteria. Although the MAIC criteria are lower when the study selects two lags, despite these mixed results, the decision is based on the MBIC and MQIC criteria. The results can be seen in Table 4. After passing the Hansen's J test, which is a statistical test used for testing over-identifying restrictions, the optimal lag length should be the one that minimizes the MBIC, MAIC and MQIC information criteria (Serena and Perron, 2001).

Table 4. *Lag Length Selection*

Lag	J	J pvalue	MBIC	MAIC	MQIC
1	40.67	0.1398	-96.18	-23.32	-52.33
2	4.015	0.998	-64.41	-27.98	-42.48

Note: *The Bayesian information criterion (MBIC), the Akaike information criteria (MAIC), and the Quinn information criterion (MQIC)*
Source: *Authors' computation (2021)*

4.3.1 Maximum Likelihood Estimate

In this section, results show that major deviation from the Cobb-Douglas function is attributed to inefficiency. As indicated by gamma in Table 5, about 96% of the variation in loans and advances is attributed to the inefficient use of capital, labour, and borrowed fund. Kumbhakar, Wang and Homecastle (2015) indicated that the measure is not really sufficient to check the relevance of the stochastic frontier model. They suggest the likelihood ratio statistics which emphasizes the estimates of restrictive and non-restrictive models. Hence, this value is very close to 1. By implication, many variations of the error term in the model regading loan and advances to customers are being accounted for by the technical inefficiency rather than noise effect. However, 4% of the difference between the actual result and the observed result is attributed to the noise effect from the composite error term. Hence, the statistical significance of gamma results showed that the model is a good predictor of technical inefficiency and consistent with the extant literature (Coelli, 1996; Novignon and Lawanson, 2014). From this result, it can be seen that loans and advances in addition to input factors such as the price of labour, price of capital, and the borrowed fund have a significant effect on the performance of microfinance banks.

Following Kumbhakar, Wang, and Homecastle (2015), determining the appropriate functional form of the model is important. To examine the functional form of the model, the likelihood ratio test carried out satisfied the assumption of the Cobb-Douglas function based on restrictive and non-restrictive modules. The result shows that the null hypothesis cannot be rejected; hence the Cobb-Douglas frontier was run for the model instead of a translog that supports the acceptance of an alternative hypothesis. All the variables (pCAP, pBOR) in the maximum likelihood estimate are significant at a 1% level of significance except for the price of labour (pLAB). Besides, the implication of variables in the natural logarithm form suggests that the coefficient can be treated as elasticities. Therefore, the estimated elasticity of microfinance bank loans and advances to customers due to capital, labour, and the borrowed fund is 0.93, 0.10, and 0.52 respectively. Furthermore, there is also a negative relationship between all the explanatory variables and the dependent variable, loan, and advances to customers, except for the price of capital (pCAP) having a positive relationship. We talk of efficiency where loans and advances are created at the cheapest possible staff cost indicating that as banks produce more, less is paid for labour. However, more equipment and other fixed assets may be required to expand the outreach of the banks. Hence, loans and advances expansion may lead to a more fixed asset being acquired. As more loans and advances to customers are being created, a cheaper source of funds will be explored by the bank to enhance their bottom-line.

Consequently, as the price of borrowed fund rises, the risk level increases which imply that bank will collect less borrowed fund, leading to fewer chances of creating loans and advances. This best affirmed the fact that one of the major problems facing microfinance banks is poor quality manpower which explains the reason for insignificant pLAB in the model. Inadequate capitalization also a part of the reasons that could be advanced. This is consistent with the existing study (Maudos, Pastor, Perez and Quesada, 1999) that suggest huge expenses and cost on capital and labour can inhibit the loan and advances available to customers unlike the result on the borrowed fund which increases the loan and advances to customers. The negative and statistically significant relationship between loan and borrowed funds is expected. It indicates that the cost of borrowed funds decreases as more loans and advances are extended to customers because an efficient microfinance institution will achieve appropriate outreach expansion that will make a cheaper fund to be available to finance the loan and advances: Bolarinwa, Akinyele and Vo (2021) affirmed this position.

Table 5. *Maximum Likelihood Estimate for the Cobb-Douglas Function*

Dependent: Loan and Advances				
		Coefficient	**Std. Error**	**Prob. Value**
Production	pLAB	-0.1047	9.6507	0.991
Frontier	pCAP	0.9339	0.0279	0.000
	pBOR	-0.5232	0.1556	0.001
	CONSTANT	2.1951	0.4676	0.000
Variance	Sigma_u	14.7832	13.3672	0.269
Parameters	Sigma_v	0.6304	0.0719	0.000
	Lambda	23.4519	13.3629	0.079
	Gamma	0.9591		
	Unrestrictive LKH	-218.3362		
	Restrictive LKH	-250.3861		
	LKH Ratio	64.0998		
Model	No of OBS	144		
Diagnostic	No of Groups	18		
	Prob. Value	0.000		

Source: *Authors' computation (2021).*

4.3.2 Technical Efficiency

On average, a typical microfinance bank in the Southwestern region between the period 2010 and 2017 operated at a 46.6% efficient level. This implies that on average, a microfinance bank in the region was operating at about 53.4% below the maximum potential level. Put differently, there is a possibility that an average of microfinance banks could increase their loan and advances to customers by 53.4% without having to employ more labor, capital, and borrowed fund. As indicated among 144 observations, the most efficient microfinance bank in the southwest was performing at 68% which is about 32% below the frontier point (see Table 6). This best explains the need to examine the cause of microfinance banks' inefficiency within the region and a critical appraisal of most of the complementary programs contained in the reform introduced by the Central Bank of Nigeria towards improving the efficiency of microfinance banks.

Table 6. *Technical Efficiency*

	Efficiency Score
Observations	144
Mean	0.4658
Standard Deviation	0.1293
Minimum	0.2760
Maximum	0.6790

Source: *Authors' computation (2021)*

4.4 Relationship between Microfinance Bank Efficiency and Performance of Small Business

The relationship between efficiency of microfinance bank (EFF) and performance of small business (PSB) is investigated by adopting the panel vector autoregressive (PVAR) technique using associated granger causality approach. The adoption is informed by the fact that efficiency measure is a long-term phenomenon such that the efficiency level shown by a microfinance bank last year would impact its efficiency level for the current year. Having established one lag as the appropriate lag length selection and cross-sectional dependence among the banks for the model, the study performed the first-order PVAR and granger causality. The results are presented in the Table 7. The stability of the PVAR was checked and confirmed once the eigenvalues are inside the unit circle. It indicates that our variables are stationary (Lutkepohl, 2005).

The results of the PVAR in Table 8 show that the lag of both EFF, PSB and LIQD are significant at 1%. Also, in the microfinance bank efficiency (EFF) line of equation, the PSB is not significant though

the LIQD is significant at 1%. This implies that the PSB insignificantly impacts the efficiency of the microfinance bank. It is somewhat plausible because inefficient business firms are most unlikely to pay back their loan and keep their saving with microfinance banks. This will bring about lower profitability, higher level of non- performing loans in the bank portfolio, and consequently contribute little to the efficiency of microfinance banks. On the other hand, the performance of the small business (PSB) line of the equation shows that the EFF of microfinance bank is also not significant on the PSB but the LIQD is significant at 1%. This could be rationalized on the ground that most of the loans that were been granted may not be appropriate in terms of tenure, type, pricing, adequacy, and sectoral allocations of loan among other terms and conditions. It is therefore expected that as efficiency improves over time through the introduction of more progressive policies by the regulatory authority, the efficiency level of MFB now at a growing stage will improve and we will begin to witness more positive impact of microfinance bank efficiency on the performance of a small business.

It is also observed that the liquidity (LIQD) has a positive and significant effect on the efficient microfinance banks and performance of small business. This implies that liquidity has integral contributions towards enhancing the microfinance bank ability and to finance MSMEs, thereby contributing to the performance of MSMEs, which agrees with the a priori expectation. This may be advanced as the reason why the government made several efforts to relax policy and various reforms for enhancing bank liquidity in Nigeria since existing literature claimed that bank liquidity determines the efficiency microfinance bank. The higher value of liquidity ratio makes bank more liquid and less vulnerable to failure (Bolarinwa, Akinyele and Vo, 2021). Results in Table 8 confirm the stability of the model. The eigenvalues are inside the unit circle as displayed in figure 1.

Table 7. *The Panel Vector Autoregressive Result*

Variable		EFF	PSB	LIQD
PSB	L1	0.136	0.983***	0.015
		(0.175)	(0.116)	(0.048)
EFF	L1	0.596***	-0.076	0.039
		(0.107)	(0.071)	(0.026)
LIQD	L1	-0.848***	-1.013***	0.971***
		(0.363)	(0.394)	(0.176)

Note: ****, ** and * denote statistical significance of 1%, 5% and 10% level, respectively; L1 represent one lag length used.*

Source: *Authors' computation.*

Table 8. *Eigenvalue Stability Condition*

Real	Imaginary	Modulus
0.9349	-0.1806	0.9523
0.9349	0 .1806	0.9523
0.6806	0	0.6806

Source: *Authors' computation*

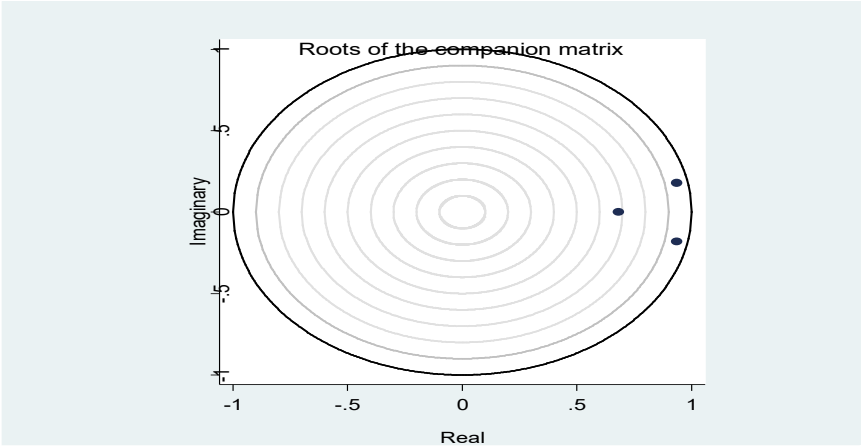

Figure 1. *Eigenvalue Stability Condition*. Source: *Authors' computation*

4.5 Granger Causality Test Results

The Granger causality test based on the Wald test is performed in the study. The null hypothesis is the absence of causality. Moreover, the presence of endogeneity is confirmed by the blocks of exogeneity analysis (ALL). The results of the Granger causality test are presented in Table 9, which indicate that the past efficiency of microfinance banks (EFF) does not explain the present level of performance of the small business (PSB). The causal relationship between PSB and EFF is not also established by the findings, suggesting that there is no direction of causal relationship between the variables. By implication, past PSB could not explain the present level of EFF.

Similarly, the bivariate causality shows that simultaneously the past of EFF and LIQD does not granger cause PSB. But in clear cut terms, PSB granger cause LIQD, the findings establish a unidirectional causal relationship between LIQD and PSB. In the same vein, the bivariate causality shows that simultaneously the past of PSB and LIQD does not granger cause EFF, though EFF granger causes LIQD. The findings indeed established a unidirectional causal relationship between LIQD and EFF. Looking at the results, we found that there is a unidirectional causality running from performance of small businesses to liquidity that is, the report of the direction of causality reveals that there exists no causality relationship between efficiency of microfinance banks and the performance of small business. This is in agreement with the finding of Crépon, Devoto, Duflo and Parienté (2011) for a study carried out in Morocco.

In Nigeria, findings can be rationalized on the ground that owing to low level of efficiency, microfinance banks grant to MSMEs loan that are not appropriate in terms of adequacy, pricing, repayment mode and so on such that MSMEs could not derive full benefit from the loans to guarantee their performance and consequently ensure full repayments that will build their relationship with microfinance banks for improved patronage and higher graduated loan.

It is however discovered that liquidity has a causal relationship with the efficiency of microfinance banks while in turn will positively impact the credit creation ability of microfinance banks and by extension make funds available for the growth of MSMEs. Hence, it is advisable that government should improve on making more intervention fund by way of wholesale funding available to microfinance banks in order to enhance their liquidity.

These findings are in line with Lawanson (2016) who investigated the effects of microfinance on the growth of small business in Nigeria. It is submitted that a rise in micro-loan can enhance performance of MSMEs but at the moment the size not significant to achieve this This is in agreement with the \rmance of MSMEs but at the moment the size not significant to achieve this. Similarly, Nwigwe, Ononona and Okoruwa, (2012) lend support to the finding by arguing that microfinance is a good avenue to spur growth, but more positive measures must be put in place by government through monetary authority to make microfinance a strong tool to empower vulnerable micro-entrepreneurs. As confirmed by previous studies particularly on global level involving several

microfinance institutions (Hassan and Sanchez, 2009; Ayub, 2013), MFBs have the potential to generate substantial growth in MSMEs output but it is currently at a fragile stage.

Table 9. *Granger Causality Test*

	PSB	EFF	LIQD
PSB does not cause	-	1.184	6.611***
EFF does not cause	0.608	-	5.450***
LIQD does not cause	0.099	2.387	-
ALL	0.759	2.464	11.904***

Note: ****, ** and * denote statistical significance of 1%, 5% and 10% level, respectively.* **Source:** *Authors' computation*

5. Conclusion

Micro, Small, and Medium Enterprises (MSMEs) have been identified as a catalyst for economic growth and development, most especially in developing economies like Nigeria. Despite the crucial importance of MSMEs as a critical part of the business landscape in any country, it has been established that lack of access to finance from financial institutions is one of the key problems facing the sector, thereby hindering their ability to contribute optimally to the economic development of many countries. Like many countries of the world, Nigeria also relies on the mutually supportive and benefit-sharing of the social networking of microfinance banks since the search for an investible

fund by MSMEs has been a herculean task. Given that a greater proportion of studies on the relationship between microfinance efficiency and performance of MSMEs have concentrated efforts on the demand side effect, the study focuses on both the demand and supply perspectives, specifically regarding the six states in Southwestern Nigeria (Lagos, Ogun, Oyo, Osun, Ondo and Ekiti State).

Based on the analyses, it is found that the performance of MSMEs has an insignificant impact on the efficiency of the microfinance banks, suggesting a negligible role in the operation of microfinance banks. This could be as a result of the fact that most small business firms are likely unable to pay back their loans and keep their savings with microfinance banks. Similarly, the efficiency of microfinance banks does not significantly influence the performance of MSMEs. This could be attributed to the possibility that most of the loans granted by microfinance banks may be inappropriate in terms of tenure, type, pricing, adequacy, and sectoral allocations of loans. Furthermore, no direction of any causal relationship is found to be existing between the efficiency of microfinance banks and performance of the small business (PSB). By implication, past PSB could not explain the present level of EFF and vice versa. It could be posited that poor performance of MSMEs as well as inefficiency of microfinance banks are the major contributing factors. However, the size of microfinance banks and liquidity are key drivers of the efficiency of Microfinance banks in south-west Nigeria, while levels of huge non-performing would adversely affect their operational efficiency.

It is therefore suggested that microfinance banks should adopt a suitable lending methodology such as proprietary lending technology to address the problem of high credit risks associated with business lending. Policy makers should create a conducive business environment to encourage local and foreign investors to invest in the microfinance industry by de-risking the macroeconomic environment. In addition, given the lack of information, knowledge and entrepreneurial skills by most businesses owners required to grow their businesses, CBN should ensure that MFBs set up MSMEs desk in their respective offices to handle the capacity building of the business owners. Ultimately, there should be effective risk-based supervision, as well as the adoption of financial inclusion strategy and agent banking relationship more effectively.

List of abbreviations

MSMEs	Micro, Small and Medium Enterprises
PVAR	Panel Vector Autoregressive
GDP	Gross Domestic Product
CGAP	Consultative Group Against the Poor
MFBs	Microfinance Banks
MFIs	Microfinance Institutions
NBS	National Bureau of Statistics
CBN	Central Bank of Nigeria
SGMM	System Generalized Method of Moments
SFA	Stochastic Frontier Analysis
DEA	Data Envelop Analysis
NGO	Non-Governmental Organization
SMEs	Small and Medium Enterprises
OLS	Ordinary Least Square
LR	Likelihood Ratio
DFA	Distribution Free Approach
LLC	Levin Lin-Chu
IPS	Im-Peseran-Shin
ADF	Augmented Dickey-Fuller- Fisher
MBIC	The Bayesian Information Criterion
MAIC	The Akaike Information Criteria
MQIC	The Quinn Information Criterion
PP	Philip Perron-Fisher

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