

BANK BRANCH NETWORK EXPANSION AND FINANCIAL PERFORMANCE: AN EMPIRICAL SURVEY OF NIGERIAN BANKING SYSTEM

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ABSTRACT

This paper analyzed the growth and financial results of the bank branch network: An empirical survey of the Nigerian banking system. Time series data from the Central Bank of Nigeria (CBN) quarterly annual report was used (2020) and Nigeria Deposit Insurance Corporation (2020). The study spanned from 1989 to 2020. The research applied statistical approaches to econometrics and was focused on the error correction model (ECM) for stationarity, co-integration, and model estimation testing. The results showed that the sequence was stationary and co-integrated at none * with a long-term relationship as ECM (-1) co-efficient was negative and important at 5%. The results indicated that bank Total Asset (LnBAS) and bank asset development (LnBAG) have a positive impact on Nigeria's bank deposit base (total bank deposit / GDP). However, during the time the total number of banks network (LnTNB) and the prime lending rate (LnPLR) has a negative influence on the bank deposit base (total bank deposit / GDP) (LnBDB). Accordingly, the researcher concluded that bank deposit base (total bank deposit / GDP) (LnBDB) in Nigeria was guided during the period by the total number of banks network (LnTNB) and bank asset growth (LnBAG). Inflation rate as control variable has had a major positive long-term impact on the bank deposit base (total bank deposit / GDP) (LnBDB), hence it was suggested that to sustain a high bank deposit base (total bank deposit / GDP) (LnBDB), the total number of banks network

should be increased over the period (LnTNB) and efforts should be made to strengthen the growth of bank assets (LnB).

Keywords: Branch Network Expansion, Financial Performance, Empirical Survey, Nigeria Financial System.

1. INTRODUCTION

As a result of current global banking practices, high and intense competition in the banking industry in Nigeria, aggressive corporate capital restructuring, economic meltdown, sophisticated customer demands and financial technology, as well as aggressive fund mobilization strategies have been adopted by emerging commercial banks and micro-finance banks, these various customer-oriented strategies were adopted in a bid to increase the level of her profitability, fund mobilization and at the same time remain firm in the system. They now targeted their services to consumers and expanded outlays (branches) to meet the teeming population's learning needs. Since branch network expansion enhances accessibility to bank deposit funds as well as stabilizing the economy, commercial banks have recently tailored their services in this direction taking into account banking system stability, portfolio diversification, asset volatility, entrepreneurial patterns, fundraising syndrome, and what view. Single-branch banking advocates deny these arguments, however, arguing that branch banking structure contributes to bureaucracy, disrupts decision-making and causes needless duplication of offices (Adelowotan & Oshadare, 2016; Osiegbu & Onuorah, 2011). Yet when you compare these two banking systems: increased branch banking has a direct impact on bank deposits, unlike unit banking (Adelowotan, 2016). For emerging economies like Nigeria where economic penetration through bank lending is necessary, the need for an all-inclusive banking system that will increase the size of the banked population and productivity cannot be over-emphasized (Ebiringa, Onuorah & Obi, 2014).

Besides, the Nigerian resent banking sector found that they could not raise massive deposits using the traditional deposit medium rather than relying on non-conventional mobilization strategy for deposits. Micro-finance banks have now focused on one-to-one engagement with retail clients, supermarkets, workplaces, schools and much more through a non-conventional deposit mobilization strategy. In the same vein, after Nigeria's rural banking strategy failed, increased branch networking serves as one channel by which the Nigerian financial system can extend its tentacles to grass-root customers (Onuorah, & Ogbonna, 2016). Therefore, to ensure that commercial banks and microfinance banks can collect adequate deposit funds to meet the ease of accessibility of credit facilities, effective, timely, consistent and well-planned policy

instruments, practices and programs should be implemented to increase the mobilization of the funds in Nigeria. This will also benefit shareholders who are more concerned about policies that will drive higher returns (from interests on borrowing) which will be ultimately paid to them as dividends (See Onuorah & Chigbu, 2013). The methods can be applied by extension of the branch network. This study aims to conduct a systematic survey of the impact of branch network expansion on Nigerian banking sector financial results.

2. LITERATURE REVIEWS

2.1 Conceptual issues

In recent times the expansion of the branch network has gained scholarly attention. According to Tuwei (2016); Aladwan (2015), the expansion of the branch network is a sitting bank branch in strategic and diverse locations across the country to grow its customer base, gaining more market control, growing profits, reducing costs and risks, raising the availability of banking products and services, enhancing the efficiency of banks in generating income irrespective of the cost involved and channels of distributions that are obtainable. Athanasoglou and Gioka(2007) added that the expansion of the branch network helps to support bank growth by providing a larger branch network to boost accessibility and the facility to obtain banking products and services.

According to the CBN report (2018), the Nigerian banking industry is increasing its branch network system to gain market power, have a lot of access to loan facilities, increase its customer base and ensure a sustainable financial basis. And most of the branches are concentrated in the country's urban and semi-urban regions. In a separate study, Edward (2010) & Peterson (2008) reported that the main reason behind the decline of bank branches in rural areas is that operating costs in rural areas outweigh their profits, insecurity, low-income rural residents, poor banking habits of rural residents, analphabetism, lack of rural commercial activity, high business risk, lack of effective mobile deposit, strategy for mobilization and accumulation and other bottlenecks which discourage branch networking in rural areas of the country.

In a separate review, however, Paul (2010), & Philip (2009) stated that, over time, only a few banks located in rural areas experienced improved profitability. The rhetorical question here is, will bank policymakers concentrate more on urban and semi-urban areas? If banks need to attract more customer base, it needs to concentrate its attention on rural areas. Moreover, the CBN bulletin (2020) notes that the total number of full-flesh service branches with the growth of bank assets in Nigeria has increased steadily since the late 1980s (see table 1.1 below).Branch network growth is expected to have a positive impact on bank profitability in Nigeria as the branches would have to take on a lot of costs while serving their legislative duties of satisfying the needs

of their current customers and attracting new ones. The related costs may include the cost of acquisitions, research and development (R&D), the cost of sending staff to the branches, and the cost of disclosing business viability to assess the branch's economic desirability and financial uncertainty. All the divisions required to preserve the consistency of the branch had to be considered (Adelowotan&Oshadare, 2016).

In this context, this study assessed branch network expansion using the total number of branches of deposit money banks in Nigeria as follows;

Table 1: Classification of Commercial Banks Branches in Nigeria.

Period	Number of Banks	Branches			
		Urban	Rural	Total	Total
1981	20	622	240	862	862
1982	22	676	308	984	984
1983	25	694	407	1,107	1,107
1984	27	810	432	1,242	1,242
1985	28	839	451	1,290	1,290
1986	29	879	481	1,360	1,360
1987	34	947	529	1,476	1,476
1988	42	1057	602	1,659	1,659
1989	47	1093	756	1,849	1,849
1990	58	1169	765	1,918	1,918
1991	65	1253	765	2,018	2,018
1992	65	1495	774	2,269	2,269
1993	66	1577	775	2,352	2,352
1994	65	1634	763	2,397	2,397
1995	64	1661	701	2,362	2,362
1996	64	1727	675	2,402	2,402
1997	64	1728	675	2,403	2,403
1998	54	1466	714	2,180	2,180
1999	54	1467	714	2,181	2,181
2000	54	1466	722	2,188	2,188
2001	90	1466	722	2,188	2,188
2002	90	2283	722	3,005	3,005
2003	90	2520	722	3,242	3,242
2004	89	2765	722	3,487	3,487
2005 ²	25	00	00	25	25

Source: Central Bank of Nigeria annual report 2020

This type of classification stopped in 2005 due to consolidation in deposit money banks that started in 2006 in Nigeria Banking industries, although there was no classification on home base (urban and rural).

Table 1.2: Number of Deposit Money Banks Branches in Nigeria by States

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Number of Banks In Nigeria.	25	24	24	24	24	24	21	24	24	25	25	26
Abia	104	111	138	141	146	125	138	147	144	135	142	137
Abuja(FCT)	163	219	283	361	398	359	379	397	380	369	421	437
Adamawa	39	52	58	63	67	79	63	61	47	47	57	64
Akwa-Ibom	60	78	85	99	99	92	100	94	92	103	106	114
Anambra	121	174	212	217	237	222	228	224	219	218	219	214
Bauchi	35	45	50	51	53	50	46	46	47	48	50	47
Bayelsa	28	31	37	38	37	37	37	38	38	38	38	39
Benue	39	53	61	71	75	57	73	76	67	63	69	71
Borno	61	57	68	71	79	68	71	69	83	72	60	61
Cross-River	36	52	63	71	79	76	76	80	79	74	78	79
Delta	98	129	174	193	198	177	194	198	178	180	200	205
Ebonyi	15	22	28	32	35	45	33	33	59	61	37	36
Edo	109	118	163	175	183	162	188	192	144	165	178	188
Ekiti	31	54	67	58	80	60	64	76	91	87	86	92
Enugu	90	93	120	130	141	116	142	147	158	151	159	162
Gombe	25	29	33	40	40	36	36	37	43	41	36	37
Imo	37	57	84	104	104	97	100	102	110	105	98	100
Jigawa	19	29	34	35	39	37	36	38	63	66	38	36
Kaduna	126	133	157	164	183	170	169	171	154	164	168	173
Kano	130	130	160	183	193	186	183	183	174	170	178	179
Katsina	33	41	50	57	62	55	58	59	73	78	56	55
Kebbi	21	31	35	36	40	40	37	38	95	37	37	35
Kogi	27	64	68	81	80	77	82	84	88	80	79	82
Kwara	39	70	67	72	79	139	75	79	104	101	78	84
Lagos	1038	1407	1551	1690	1766	1453	1692	1678	1443	1486	1645	1686
Nasarawa	19	27	40	48	58	51	49	48	68	69	49	49

Niger	46	51	69	75	80	76	79	82	67	65	78	86
Ogun	52	122	139	149	175	402	161	154	137	142	154	172
Ondo	87	91	107	109	121	109	110	119	106	101	113	120
Osun	38	81	93	92	105	118	101	104	101	99	106	108
Oyo	112	163	191	220	236	203	223	237	347	343	222	237
Plateau	77	65	73	76	79	72	77	75	75	71	70	67
Rivers	179	197	248	273	302	246	310	311	292	275	312	319
Sokoto	46	41	54	59	53	53	52	52	43	45	53	52
Taraba	16	27	30	35	37	41	35	35	40	40	34	27
Yobe	22	32	33	32	35	35	33	35	38	41	34	31
Zamfara	15	24	29	35	35	33	34	40	39	38	30	31
TOTAL	3233	4200	4952	5436	5809	5454	5564	5639	5526	5470	5570	5714

Sources: Central Bank of Nigeria (various years); Nigerian Deposit Insurance Corporation (various years) in 2006 the classification changed to Deposit Money Banks (DMBs) and the classification was made based on the 36 states of Nigeria and the Federal Capital Territory since most banks became subsidiaries because of Nigerian Bank Consolidation of Financial integration Policy using the Mechanism of merger and consolidation of Deposit Money Bank in Nigeria.

Drivers of Branch Network Expansion

Scholars have pointed out numerous factors influencing the growth of the branch network of commercial banks and microfinance banks. The following explanations are listed in Adelowotan (2016); Kazumine (2016); Musyoka (2011); Salim (2011); Bisher (2011), Carlson and Mitchner (2005). The need to increase their capital base

1. The need to gain market power/positioning
2. Enhanced profitability and financial stability
3. Increase sales and customer base
4. Cost Reduction and Control
5. Enhanced banking services and Product
6. Market attractiveness
7. The need to meet both regulatory and global banking practices
8. The need to withstand economic vagaries and intense competition in the system
9. Adoption of electronic banking, mobile banking, and agency banking.

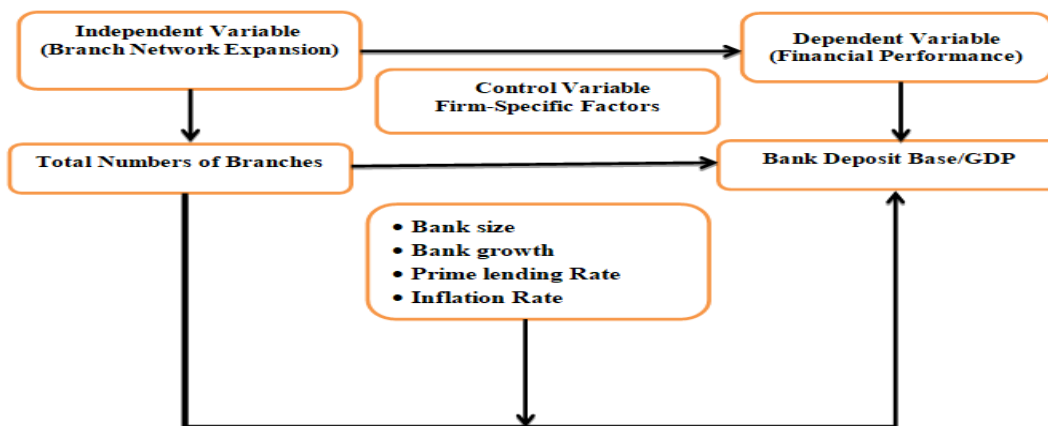
Financial Performance

Because of its multifaceted complexity, the idea of financial performance has gained much scholarly attention in recent times. Aladwan(2015) said a bank is said to be profitability if its revenue generation is greater than its operating expenses. In other words, a bank is said to be profitability if the production and storage of cash and cash equivalents do not incur extra operating costs. Banks make a profit by investing their deposit and capital funds in interest-generating assets on their mobilized deposits and capital generated. There's also no clear criterion for calculating bank output as a proxy. Return on assets, Return on shareholder capital, Net profit margin, firm growth and scale, deposit ratio to GDP, EPS, many but few to list (Adelowotan (2016); Kazumine, 2016); Musyoka, 2011); Salim, 2011); Bisher, 2011)). However, as a parameter to proxy banks ' financial performance in Nigeria, this study will adopt the aggregate bank size, bank production, and customer deposit base.

Conceptual Model

This study's conceptual model posits a non-causal relationship between the expansion of the branch network and financial results. The independent variable is branch network expansion that is supported by the total number of commercial bank branches in Nigeria while the dependent variable is the financial output that is supported by aggregate bank deposit base (BDB) with the Gross Domestic Product (BDB / GDP). The control variable captures certain factors that influence financial performance/company-specific factors that are proxied by bank size, business growth, and prime lending rate. The conceptual model adopted in this analysis is described in the diagram below

Figure 2.1: Conceptual Model



Source: Researcher, 2021.

2.2 Theoretical Propositions

The theoretical propositions which guided this study are built on three theories namely

1. Agency Theory (AGT)
2. Stakeholders' Theory (SHT)
3. Growth of the Filter Theory (GFT)

Agency Theory (AGT)

Owing to the separation of owners from managers, Agency Theory (AGT) became more formalised. According to Jessen and Meckling(1976), AGT is a management approach in which an agent (usual people at the top management level) represents the principal (owners) in the day-to-day running of the company. The AGT ensures a symbiotic relationship exists between the principal and the agent. Furthermore, AGT guarantees that the agent will behave in compliance with the principal's priorities and that the principal must ensure that he always considers the agent in its decision-making phase. The key objectives of owners are to improve productivity, cut costs, optimize long-term sustainable competitiveness for the property, and social responsibility for companies. The agent must, therefore, ensure that he/she manages the firm resources at his / her disposal efficiently and effectively to achieve these above-mentioned goals by ensuring that the best interest of the shareholders is achieved taking their interest into account (Duckworth & Moore, 2010; Nyatika, 2017).

Stakeholders' Theory (SHT)

Freeman (1984) initially posited this idea. The key crux that underpins this principle is that businesses have specific stakeholders and that management must consider and recognize the company's diverse stakeholders in the execution of its policies. The company's diverse stakeholders include shareholders, management, staff, bank clients and the host community. The needs of stakeholders are special, subjective and convincing as such the organization should follow multiple strategies and solutions catering to the various needs of its stakeholders. The achievement of the profitability target thus serves as one of how the company addresses the longing needs of its diverse stakeholders (Friedman & Miles, 2002; Duckworth & Moore, 2010; Ariambe&Muturi, 2015).Banks embrace innovative technology by upgrading the physical characteristics of their goods and services, adding new product lines or services to improve the quality of bank products and services, usability, comfort and versatility to maintain existing customers, attracting new ones, which in turn has a direct impact leading to increased revenue and a sustainable bank profit base.

Growth of the Filter Theory (GFT)

Alchain (1950) initially posited this idea. Growth of the Filter Theory (GFT) claims that steady and sustained firm growth helps the firm overcome intense system competition, gradually rising out-smart firms, and create a durable network of protection that can withstand economic vagaries (Alchian& Harold, 2011). Nevertheless, companies that are gradually growing and expanding may lose their market power and leave the system through the evolutionary process of separation. And if profitability is a function of firm financial soundness, it should be easy to infer that high firm growth levels would be reported by cost-effective firms (Alchian& Harold, 2011). To further strengthen this, Delmar and McKelvie (2013) argue that highly successful companies can expand because they can easily achieve any opportunity they try.

2.3 Empirical Studies

Expansion, growth and expansion of the branch network have a direct effect on cost structure, bank emphasis/targets, and profitability. The diverse empiricist results are summarized below:

Table 2.1: Summary of Empirical Studies on branch network expansion and Financial Performance Nexus

Author (s)	Country	Period	Research Objective	Research Findings	Critics/Gaps
Nyatika 2017	Kenya	2012-2016	To establish a link between branch network expansion and financial performance of commercial banks in Kenya	Branch network expansion has a significant effect on the financial performance of commercial banks in Kenya. Also, operational efficiency control branch network expansion and ROA while bank size, bank customer base, and capital adequacy does not control branch network expansion and ROA	The study is restricted to the commercial banks in Kenya and has a short time duration of 5 years
Bisher 2011	Kenya	2000-2010	To examine the relationship between bank size and financial performance of commercial banks in Kenya	Bank size has a significant and weak effect on the financial performance of commercial banks in Kenya.	The study is restricted to the commercial banks in Kenya and been conducted 9 years ago, its findings are not recent and up-to-date

Tuwei 2016	Kenya	2015	To examine the link between numbers of bank branches and financial performance of private colleges in Kenya	Bank branches have a direct and significant effect on organizational performance	The study adopted the questionnaire. The information generated from Questionnaires is sometimes not true.
Musyoka 2011	Kenya	2000-2010	To establish a link between branch network expansion and financial performance of commercial banks in Kenya	Bank branches have a direct and significant effect on the financial performance of the commercial banks in Kenya in the years' understudy	The study was conducted 9 years ago and most of the banks might have either been consolidated or liquidated.
Adewotan&Oshadar 2016	Nigeria	1981-2013	To assess how branch network growth has affected the performance of the bank in Nigeria from 1981-2013	Findings revealed that there is a direct relationship between branch network growth (branches situated in rural, urban areas, and domiciled in foreign countries) and total asset growth. However, there is no systematic relationship between the total numbers of branches and bank performance	The study is devoid of the theoretical framework. Its findings are not recent.
Kazumine2016	Japan	2016	To check whether regional banks in Japan entered neighbouring country's banking industry and its impact on lending-based income	Findings revealed that regional banks in Japan have entered neighbouring country's banking industry and recorded positive impact on lending-based income	The study is devoid of the theoretical framework
Mehmet &Suleyman 2011	Turkey	2016	To advance a performance model for measuring the scale efficiency and improve bank branches' financial capabilities by conducting SWOT Analysis. Also, to examine the production and profitability of bank branches	Findings revealed that both bank size and scale efficiency moves in the same direction. However, increased bank size decreases efficiency.	The study is devoid of the theoretical framework since it is just an explorative research approach

Meryl & Fotis 2009	United Kingdom	1998-2008	To develop a performance model for measuring bank branches performance using operational research & Artificial Intelligence tactics	Operational research & Artificial Intelligence tactics when efficiently used can affect bank branches performance	The study is devoid of the theoretical framework
Nargis, Mujeri, & Muneer 2016	Bangladesh	2014-2016	To examine the rationale behind the adoption of and possibly identify the key determinants of branch network expansion of Microfinance institutions with her financial sustainability	The findings revealed amongst others that, the feature of branch locational and the number of potential customers as the most paramount factor while deciding on opening a new branch outlet. Also, branch location decision is based on a reduction in the cost of obtaining a loan; (ii) serving the target the market in unbanked areas; and (iii) implementing targeted programs	There is no theoretical framework which underpins the work
Van rose 2016	2015	Peru	The study examined the factor which affects regional branch expansion of MFIs	The result revealed that MFIs prefer to concentrate in urban areas since those regions have a more dynamic market and are cost-efficient compared to rural areas. Also, the likelihood of having MFIs is higher in regions with bank presence.	The study is only restricted to the MFIs.

Source: Compiled by the researcher from various kinds of literature.

Based on the numerous empirical studies discussed above, it has become clear that due to the lack of analysis, there is a need to do so because of an in-depth study on the subject. The hypothesis of this analysis is presented in a null form, following the empirical studies discussed above:

H₀1: Bank branch expansion has no significant effect on the financial performance of banks in Nigeria.

Literature Gap

This present study presents some gap in the existing body of knowledge in the following ways:

- Less consideration has been given to the link between branch network expansion and financial results, particularly as it relates to the Nigerian economy. There are numerous series of write-ups in the developing economy but this is not the case based on the Nigerian background. This study seeks to add to the few African works on the subject.
- It is also clear that objective studies on the growth of the branch network and financial results are inconclusive. Few observational studies have found negative outcomes while most others have reported positive results. In this way, one cannot say explicitly with certainty that the effect of branch network expansion on financial results is positive or not. Based on these findings, by analyzing the impact of branch network expansion on financial performance in Nigeria, we add to the present learning set.
- The majority of research on the subject matter lacks theoretical context. This research, however, adopts Agency Theory (AGT), Stakeholders' Theory (SHT), and Filter Theory Development (GFT) to support the analysis.
- The study presented up-to-date, detailed, recent and timely information on the subject. That represents a gap in the current information structure.

3. Research Methodology

This study looked holistically at the impact of branch network expansion on commercial banks' financial results in Nigeria. The study followed a quantitative approach to analysis using data collected from 1989-2020 by the Central Bank of and Nigerian Deposit Insurance Corporation. The research followed the empirical approach obtained from evaluating and interpreting regression. The regression study takes into account all Nigerian commercial banks for thirty (30) years. A successful model in the researcher is one that passes the fitness test before it can be accepted as a basis for debate, review and interpretation of the results of the data. For this research work, the methodological method is multiple regression analysis. The model has a functional form expressed as:

$$BDB=f(TNB, BAS, BAG, PLR, INF).....1$$

Explicitly, it is expressed as:

$$\text{LnBDB}_t = \alpha_0 + \alpha_1 \text{LnTNB}_t + \alpha_2 \text{LnBAS}_t + \alpha_3 \text{LnBAG}_t + \alpha_4 \text{LnPLR}_t + \alpha_5 \text{LnINFR}_t + \mu \text{ECM}(-1) \dots\dots\dots 2$$

Where

LnBDB= Log of Bank deposit base (total bank deposit/ GDP)

LnTNB= Log of Total Number of Banks Network during the Period

LnBAS= Log of Bank Total Asset

LnBAG= Log of Bank Asset Growth

LnPLR= Log of Prime lending Rate

LnINF= Log of the Inflation rate

ECM (-1) Error correction

μ = stochastic error term

t = Time-series dimension and ranges from 1 to T

α_1 α_2 α_3 α_4 and α_5 are the parameters estimated

The independent variable in the model is expected to have a positive effect on the dependent variable while the study captured bank total assets, bank asset growth, prime lending rates, and inflation levels to track the relationship between banks' branch network expansion and financial performance in Nigeria. Therefore, there is the following presumption of a priori:

$\alpha_1 > 0$ $\alpha_2 > 0$ $\alpha_3 > 0$ $\alpha_4 > 0$ and $\alpha_5 > 0$

4. Results

4.1. Test of Lag Order Selection

Table 4.1 presents the possible lag order selection of variables for unit root test and cointegration for the appropriate model estimation procedure

VAR Lag Order Selection Criteria
Endogenous variables: LnHDI
Exogenous variables: C LnCOPRLnFPPLnGFCFLnINFR
REER
Date: 10/10/21 Time: 22:08
Sample: 1989 2020
Included observations: 28

Lag	LogL	LR	FPE	AIC	SC
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0	-0.302239	NA	0.073421	0.457296	0.542723
1	10.13421	15.98703*	0.028808*	-0.422087*	-0.034035*
2	13.95560	0.166269	0.241774	-0.453971	0.126634

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Source: E-views 9.0 Extracts

To establish the existence of the lag for evaluating the cointegration of time series variables for appropriate estimation procedure, lag selection criteria was adopted based on LR, FPE, AIC and SC criterion. The findings show that the variables (series) have a maximum lag value of 1* as shown in table 4.2.

4.2. Test of Stationarity of Variables

Stationarity test of the variables using Phillips-perron (PP) test presented in Table 4.2 indicates that the variables were stationary at first difference, I(1) series.

Table 4.2 Unit Root Test Results

Variable	Order	PP	Critical value	P-value
LnTNB	I(1)	-23.9419	-2.9810	0.0001
LnBDB	I(1)	-4.4927	-2.9810	0.0015
LnPLR	I(1)	-5.7050	-2.9810	0.0000
LnBAS	I(1)	-5.6049	-2.9810	0.0001
DTINV	I(1)	-6.5492	-2.9810	0.0001
DINTR	I(1)	-4.7623	-2.9810	0.0000
DINFR	I(1)	-3.7186	-2.9810	0.0098

Source: E-views 9.0 Extracts

The table 4.2 reveals the result of stationarity of the variables selected for the study has no unit since Phillips-perron (PP) test values are greater than critical values at 5% hence, bank deposit base (total bank deposit/ GDP) (LnBDB), the total number of banks network during the period (LnTNB), Bank Total Asset (LnBAS), bank asset growth (LnBAG), prime lending rate (LnPLR) and inflation rate (LnINFR). Besides, the associated probability values were all less than 0.05 at 5%. When variables were known to be stationary, the possibility of cointegration revealed the existence of a long-run relationship among variables. Cointegration test was performed using

Johansen's multivariate approach. The results of the cointegration test of the operational variables are reported in table 4.3.

Table 4.3: Johansen Cointegration Results

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.814076	100.7829	95.75366	0.0215
At most 1	0.595145	57.04006	69.81889	0.3373
At most 2	0.411937	33.53019	47.85613	0.5276
At most 3	0.334828	19.72622	29.79707	0.4416
At most 4	0.236467	9.125774	15.49471	0.3539
At most 5	0.077983	2.110986	3.841466	0.1462

Trace test indicates 1 cointegrating equation(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Source: E-views 9.0 Extracts

From table 4.3, the trace statistic, Max-eigenvalue and MacKinnon-Haug-Michelis (1999) p values reveal the existence of cointegration at none with at least one cointegrating equation among the variables hence H_0 is rejected in at 5 per cent. This is because their value exceeds the critical values at the 0.05 level. This means that there is a long-term equilibrium relationship between variables (bank deposit base (complete bank deposit / GDP) (LnBDB), the total number of bank networks over the duration (LnTNB), Bank Total Asset (LnBAS), bank asset development (LnBAG), prime lending rate (LnPLR) and inflation rate (LnINFR). In the sequence, equations are co-integrated at zero, recording normalized co-integrative equations. Table 4.3 shows that the variables are cointegrated, error correction (EC) model estimate can be used to estimate the model.

4.4 Vector Error Correction Model (ECM)

Table 4.4 presents the Vector Error Correction Model (ECM) Results

Vector Error Correction Estimates
 Date: 10/10/21 Time: 06:33
 Sample (adjusted): 19902020
 Included observations: 29 after adjustments
 Standard errors in () & t-statistics in []

CointegratingEq: CointEq1

LNBDB(-1)	1.000000	
INFR(-1)	0.031683 (0.01444) [2.19367]	
C	-6.494322	
Error Correction:	D(LNBDB)	D(INFR)
CointEq1	-3.186490 (1.13287) [-2.40359]	-12.19786 (4.39528) [-2.77522]
D(LNBDB(-1))	-0.019045 (0.29836) [-0.06383]	12.76241 (9.86978) [1.29308]
D(LNBDB(-2))	0.042886 (0.23845) [0.17985]	17.49490 (7.88817) [2.21787]
D(INFR(-1))	0.003467 (0.00598) [0.57998]	0.151288 (0.19776) [0.76501]
D(INFR(-2))	0.006059 (0.00641) [0.94588]	0.031789 (0.21191) [0.15001]
C	-0.244278 (1.14144) [-0.21401]	-90.30269 (37.7593) [-2.39154]
LNPLR	-56.200086 (20.19735) [-2.81389]	2.634945 (6.52828) [0.40362]
LNBAS	0.097613 (0.10121) [0.96446]	10.13999 (3.34807) [3.02860]
LNBAQ	9.050200 (3.05231) [2.95961]	-0.182632 (1.73053) [-0.10554]
LNTNB	-0.012746 (0.07254)	-1.443295 (2.39980)

	[-0.17570]	[-0.60142]
R-squared	0.631369	0.589911
Adj. R-squared	0.529810	0.383857
Sum sq. resids	1.536175	1681.059
S.E. equation	0.320018	10.58634
F-statistic	0.501690	1.600735
Log likelihood	-0.603712	-88.07725
Akaike AIC	0.848297	7.846180
Schwarz SC	1.335847	8.333731
Mean dependent	0.208585	-1.337200
S.D. dependent	0.288573	11.71825
Determinant resid covariance (dof adj.)		11.06919
Determinant resid covariance		3.984907
Log-likelihood		-88.22835
Akaike information criterion		8.818268
Schwarz criterion		9.890879

Estimation Proc:

=====
 EC(C,1) 1 2 LNBDB INFR @ LNPLR LNBAS LNBAG LNTNB

VAR Model:

=====

$$D(LNBDB) = A(1,1)*(B(1,1)*LNBDB(-1) + B(1,2)*INFR(-1) + B(1,3)) + C(1,1)*D(LNBDB(-1)) + C(1,2)*D(LNBDB(-2)) + C(1,3)*D(INFR(-1)) + C(1,4)*D(INFR(-2)) + C(1,5) + C(1,6)*LNPLR + C(1,7)*LNBAS + C(1,8)*LNBAG + C(1,9)*LNTNB$$

$$D(INFR) = A(2,1)*(B(1,1)*LNBDB(-1) + B(1,2)*INFR(-1) + B(1,3)) + C(2,1)*D(LNBDB(-1)) + C(2,2)*D(LNBDB(-2)) + C(2,3)*D(INFR(-1)) + C(2,4)*D(INFR(-2)) + C(2,5) + C(2,6)*LNPLR + C(2,7)*LNBAS + C(2,8)*LNBAG + C(2,9)*LNTNB$$

VAR Model - Substituted Coefficients:

=====

$$D(LNBDB) = - 0.186490274266*(LNBDB(-1) + 0.0316834662618*INFR(-1) - 6.49432198778) - 0.0190450950907*D(LNBDB(-1)) + 0.0428858751982*D(LNBDB(-2)) + 0.00346720797453*D(INFR(-1)) + 0.00605912831774*D(INFR(-2)) - 0.2442780231 - 56.20008606222*LNPLR + 0.0976134063777*LNBAS + 9.0501998007951*LNBAG - 0.0127458953693*LNTNB$$

$$D(INFR) = - 12.1978611845*(LNBDB(-1) + 0.0316834662618*INFR(-1) - 6.49432198778) + 12.7624135623*D(LNBDB(-1)) + 17.4948989218*D(LNBDB(-2)) + 0.151288293546*D(INFR(-1)) + 0.031788840299*D(INFR(-2)) - 90.3026925552 + 2.63494482121*LNPLR + 10.1399902473*LNBAS - 0.182632490966*LNBAG - 1.44329450801*LNTNB$$

Source: Author's ECM extracted results

Source: E-views 9.0 Extracts

The results of the ECM equations in Table 4.4 above indicate that the model equation variables of both banks Total Asset (LnBAS) and bank asset development (LnBAG) have a positive effect on bank deposit base (total bank deposit / GDP) (LnBDB) in Nigeria. Nevertheless, over the time the total number of banks network (LnTNB) and the prime lending rate (LnPLR) harms the bank deposit base (total bank deposit / GDP) (LnBDB). During the time, the total number of banks network (LnTNB) and the growth of bank assets (LnBAG) were not statistically relevant for the 5 per cent bank deposit base (total bank deposit / GDP) (LnBDB). Concerning the sign and magnitude of the total number of banks network during the period (LnTNB) and bank asset growth (LnBAG) confirmed key factors influencing the level of bank deposit base (total bank deposit / GDP) (LnBDB) in Nigeria. Increase in the value of bank Total Asset (LnBAS), bank asset growth (LnBAG) will bring about a 0.09 and 9.05 in bank deposit base (total bank deposit / GDP) (LnBDB) respectively. For the total number of banks network during the time (LnTNB) and prime lending rate (LnPLR) unit dollar decrease in bank deposit base volume (total bank deposit / GDP) (LnBDB) respectively by 0.013 and 56.20. On the other hand, results show that overall variability in the bank deposit base (overall bank deposit / GDP) (LnBDB) can be explained by 63 per cent by independent variables, while 37 per cent variance can be explained by the bank deposit base (total bank deposit / GDP) (LnBDB). For others, the bank deposit base (total bank deposit / GDP) (LnBDB) is not accounted for. Inflation rate as the study's control variable suggested an important, long-term positive effect on the bank deposit base (total bank deposit / GDP) (LnBDB). The findings are consistent with previous (Adelowotan, 2016; Kazumine, 2016; Musyoka, 2011; Salim, 2011; and Bisher, 2011) research.

5. Conclusion and recommendations

The researcher concluded, based on the results, that there is a long-term relationship between the variables. The findings also reported that bank Total Asset (LnBAS) and bank asset development (LnBAG) positively affect Nigeria's bank deposit base (total bank deposit / GDP). Nevertheless, over the time the total number of banks network (LnTNB) and the prime lending rate (LnPLR) harms the bank deposit base (total bank deposit / GDP) (LnBDB). The total number of bank networks throughout the time (LnTNB) and the growth of bank assets (LnBAG) drive Nigeria's bank deposit base (total bank deposit / GDP). Furthermore, the partnership is long-term. Thus it proposed that the inflation rate regime in Nigeria should be used judiciously to manage bank deposit base (total bank deposit / GDP) (LnBDB). Therefore, to sustain a high bank deposit base (total bank deposit / GDP) (LnBDB), the total number of banks network over the duration (LnTNB) should be increased and efforts should be made to strengthen the growth of bank assets (LnBAG) in Nigeria.

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