



# “Nexus of bank personnel and cost-income ratio (CIR) in Nigeria”

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ARTICLE INFO	Odunayo Olarewaju, Olusola Olawale Olarewaju, Titilayo Moromoke Oladejo and Stephen Oseko Migiro (2017). Nexus of bank personnel and cost-income ratio (CIR) in Nigeria. <i>Banks and Bank Systems</i> , 12(4), 154-162. doi: <a href="https://doi.org/10.21511/bbs.12(4-1).2017.04">10.21511/bbs.12(4-1).2017.04</a>
DOI	<a href="http://dx.doi.org/10.21511/bbs.12(4-1).2017.04">http://dx.doi.org/10.21511/bbs.12(4-1).2017.04</a>
RELEASED ON	Wednesday, 13 December 2017
RECEIVED ON	Friday, 12 May 2017
ACCEPTED ON	Thursday, 19 October 2017
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JOURNAL	"Banks and Bank Systems"
ISSN PRINT	1816-7403
ISSN ONLINE	1991-7074
PUBLISHER	LLC “Consulting Publishing Company “Business Perspectives”
FOUNDER	LLC “Consulting Publishing Company “Business Perspectives”



NUMBER OF REFERENCES

34



NUMBER OF FIGURES

0



NUMBER OF TABLES

6

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BUSINESS PERSPECTIVES



LLC "CPC "Business Perspectives"  
Hryhorii Skovoroda lane, 10, Sumy,  
40022, Ukraine

[www.businessperspectives.org](http://www.businessperspectives.org)

Received on: 12<sup>th</sup> of May, 2017

Accepted on: 19<sup>th</sup> of October, 2017

© Odunayo Magret Olarewaju,  
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Migiro, 2017

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# NEXUS OF BANK PERSONNEL AND COST-INCOME RATIO (CIR) IN NIGERIA

## Abstract

This study investigates the causal relationship between bank personnel ratio and the cost-income ratio based on performance in Nigeria for the period of 2004–2015. Secondary data collected on a cross section of 15 banks during this period was analyzed using panel unit root, cointegration and Granger causality techniques. A unit root test revealed that the variables are stationary at order one. The result further shows there is an equilibrium relationship or stability in the short and long run; furthermore, there is a bidirectional causal relationship between personnel ratio and cost-income ratio. Therefore, the study recommends that the apex bank should enforce policies in the banking sector that will minimize the unit cost of operation – even though they might hire more staff. This is to enhance the stability of the banks in Nigeria and to avoid any threat to their continuity.

## Keywords

Nigeria banking sector, Granger causality, personnel ratio, cost-income ratio (CIR)

## JEL Classification

G21

## INTRODUCTION

The state of Nigerian banking sector and its effect on stakeholders have led to increased public concern and scrutiny of its operations and performance. Banks, as an intermediary between the surplus and deficit units in all economies, need to operate successfully across a wide range of ventures before they can be classified as being healthy. The scope of their operation depends on the availability of necessary resources which augment their diversification (i.e. ability to spread). In Nigeria, a larger percentage of banks operate within a scope that, if not properly monitored, may bring their performances down. A financial institution that is cost efficient has the advantage of exploring new market products or technologies, and can reward its investors with an edge over its competitors due to being able to provide its customers with various services at an affordable price. Contrarily, low cost-efficient performance in financial institutions restricts their available options in the financial market, which makes them more vulnerable to threats and more likely to collapse during periods of financial crisis.

Traditional cost-income ratio (CIR) is a widely known measure of bank performance. Using this measure, banks compare themselves with their peers in the same industry, and bank management are prompted to impress their staff and show them the reasons to reduce costs in order to catch up with international standards. CIR is a key financial measure used to value banks because of its simplicity and intuitiveness. According to Hussain (2014), the profitability of banks is commonly influenced by two factors: the service production capability and the market conditions in terms of competition and price levels. It is commonly believed in the financial industry that a high CIR is

equivalent to low efficiency and productivity, and vice versa. In the practical sense, the annual accounts and reports of banks have highlighted their CIR as an important performance indicator among other achievements of the bank. Simply put, CIR is a performance-based ratio that places operating costs (expenses) and operating income (earnings) in relation to each other.

To promote efficiency in the banking sector, the Basel Capital Framework emphasizes the adequacy of capital. Nigerian banks have complied with it, even though some were merged or taken over in the process. The remaining banks that could meet the requirements of the Basel Framework have diversified into so many activities; most of them currently enter insurance business in order to operate with improved efficiency to increase their effective performance through a fair CIR. Recently, some Nigerian banks have opened many branches which apparently prompt them to recruit more personnel – all in an attempt to operate across a wider scope and to enjoy economies of scale. Unfortunately, a few years later, they become distressed and have to restructure their human and capital resources by laying off staff and closing some branches. These are immediate measures for resolving the challenges, while other measures like loan screening, monitoring and repayment, managerial re-structuring, proper handling of insider dealings that have greater influence on CIR, all come up later.

According to Isik and Hassan (2002), the size of a bank is a crucial driver of the variation of efficiency across banks. Banks seem to have the required personnel in order to be able to operate optimally and to enjoy economies of scale that will reduce operating costs. Nigerian banks have been known to open more branches and employ more staff whenever they experience a boom in their activities, that is, generating large and steady income with no regards to staff emoluments which constitute the highest proportion of bank operation costs. This study, therefore, seeks to know the causal relationship between personnel expense and the CIR of banks, taking cognizance of the moderating role of capital adequacy. Although capital adequacy and the performance nexus have been the major focus of past scholars in the banking sector (Morrison & White, 2001; Navapan & Tripe, 2003; Olarewaju, 2016), it is expedient to inquire into the causal relationship between these matters. Demsetz and Strahan (1997), Hassan (2006), Rossi et al. (2005), Delis and Papanikolaou (2009), and Alper and Anbar (2011) have all examined bank size and efficiency (operational performance) in several nations – taking different measures (personnel ratio or otherwise) for their bank size. However, there are few studies on causal relationship between personnel expenses and CIR-based performance in the banking sector. In fact, currently, no study has been found on this matter in the Nigerian context. Therefore, this paper intends to fill this information gap by examining the link between the personnel ratio and CIR-based performance, and to determine its stability and the causal relationship in Nigeria. Above all, this paper will contribute to the existing knowledge and literature on this subject by using panel unit root, panel cointegration test and Granger causality techniques (VEC block exogeneity, Wald test and pairwise test).

The remainder part of this work is structured as follows. Section 1 reviews the literature followed by the research method. In the next section, data analysis, discussion of findings and their consequences are addressed. The last section concludes the study, provides necessary recommendations based on the findings and makes suggestions for further research.

## 1. LITERATURE REVIEW

Isik and Hassan (2002) stated that efficiency can be driven in banking using size as an important driver. For banks to operate optimally in terms of scope and scale, they must work with a certain number of personnel in order to enjoy the bene-

fits of economies of scale. Isik and Hassan (2002), and Kaparakis et al. (1994) found that bank size increases as average cost and profit efficiency decrease. The reasons for this may be that small banks' indirect costs are relatively low because they often operate few branches, which might be an advantage for them and thereby contribute to

their increased efficiency. However, larger banks often spread loans to various customers and with little deductions for repayments but on critical examination that leads to an increased servicing and monitoring costs for large banks compared to small banks.

Contrarily, Berger and Mester (1997) and Berger et al. (1993) found that competitive pressures on US banks brought about an inconsiderable increase in cost efficiency and bank size, while Berger et al. (1997) found that small banks with few personnel show the highest level of profit efficiency and are characterized by high profitability ratios. They also conclude that “the larger the banks grow, the more their ability to control costs but it becomes harder to efficiently create revenue”. Generally, larger firms have all that it takes to generate higher level of efficiency, but El-Moussawi and Obeid (2011) concluded that the link between size and efficiency of Islamic banks does not denote large banks operating at their best size – because part of their productive inefficiency is probably due to inadequate size. In Nigeria, it is evident that it is a case of the bigger is better producing lower unit costs in the service delivery of banks, and hence, there is a need to fill this gap in the banking literature.

## 2. CONVENTIONAL ECONOMIC EFFICIENCY THEORY

The theoretical framework adopted for this study is conventional economic efficient theory. This provides a framework for managing all factors associated with operating cost in a firm and generates a scope for managers of organizations to make their business work more efficiently. This paper hinges on this theory because it emphasizes that human factors should not be ignored by a company that desires to be more efficient. It confirms that a company which demoralizes its staff because of the need to minimize costs will generate future unexpected human resources costs, which constitutes a major part of bank operating costs. Conventional economic efficiency theory states that an organization can achieve the lowest possible cost per unit of their output only by efficient structuring of such an output.

Efficient performance can only be achieved when the economies of scale at all output levels are maximized. This theory further argues that size increases efficiency by minimizing the various organizational costs of gathering and processing relevant information (Said, 2012). Huge efficiency is attainable only when the patterns of resources (human and otherwise) used in the organization are the only patterns required to achieve such an expected return. Hence, if there is an increment in bank personnel, it must be well managed, so as to decrease the personnel cost that constitutes the greater proportion of operating cost – to achieve the desired efficiency ratio and performance. The increase in staff strength should be in tandem with banks capital adequacy, which might trigger mergers and acquisitions to achieve financial and operating synergy (Sufian et al., 2008).

Operating synergy leads to operational efficiency (CIR-based performance) because it emanates from cost reductions derived from economies of scale, meaning that every cost reduction is easily achievable from expansion of firms both in size and scale. Therefore, an efficient bank tends to generate a lower cost and gain higher market share, because very large banks, due to their spread of resources, have the required staff strength to mobilize more funds from diverse segments, which will lead to higher returns for depositors and investors. Banks with a wider scale of human and capital resources can finance various viable investments by gaining better access to all available and positive NPV business opportunities. According to Bashir (1999), the larger the bank is, the higher is its ability to render a wider scale of various financial services to the public, hence, maximizing the amount of wealth for stakeholders at a reduced unit cost.

## 3. METHODOLOGY

### 3.1. Nature, scope and sources of data

The descriptive research aligns with the positivist paradigm and deductive approach, because it is purely a quantitative research. Yearly data used for this study are sourced from the annual reports and accounts of 15 listed banks out of 21 commercial banks in Nigeria. The banks were selected be-

cause they are quoted and have regular and complete data in their annual reports and are listed on the Nigeria Stock Exchange. The data covered a period of 12 years (2004–2015).

### 3.2. Measurement of variables

Specifically, the variables are: CIR (ratio of operating cost to operating income, measuring the performance of banks); PER – personnel ratio, which is the ratio of personnel expenses to total assets and capital adequacy, used as a control variable and is a proxy for debt to total equity ratio (DTE). All these variables were analyzed using the E-View 7 statistical package. The choice of these variables was based on the conventional economic efficiency theory and the literature (Odunga et al., 2013; Odunga, 2016; Hussain, 2014; Almazari, 2013; Kumbirai & Webb, 2010).

### 3.3. Estimation technique and model specification

#### 3.3.1. Panel unit root test

Due to the nature of the data used in this paper, there is a need to verify its stationary levels in order to avoid a spurious regression and result that can lead to invalid conclusions. According to Granger and Newbold (1974), a conventional regression technique based on non-stationary data produces spurious regression and statistics which may simply indicate only correlated trends – rather than the real relationship. To eliminate the problem of bogus or contradictory regression results associated with a non-stationary time series model, and to generate the possibility of a long-run equilibrium relationship, a unit root test is required. Hence, a panel unit root generated by the LLC, IPS, ADF and PP was used in this study. The general form of a panel unit root model is stated as follows:

$$\Delta x_{it} = q_i \cdot x_{i(t-1)} + \sum_{j=1}^{q_j} \varphi_j \cdot \Delta x_{i(t-j)} + \alpha_i \cdot \partial_{it} + \varepsilon_{it}, \quad (1)$$

where  $\partial_{it}$  is deterministic component. The null hypothesis to be tested is  $q_i = 0$  which signifies that  $x$  process has a unit root for each cross-section  $i$ , the alternative hypothesis  $q_i < 0$  means process is stationary around the deterministic fraction.

#### 3.3.2. Panel cointegration test

The Johansen – Fisher-based cointegration technique is followed to test for a possible long-run relationship between the parameters. This technique proposes two test statistics to determine the number of cointegrating vectors – the trace and the maximum eigenvalue.

The trace statistics will be computed as:

$$\lambda_{trace} = -T \cdot \sum_{j=r+1}^n \ln(1 - \lambda_j). \quad (2)$$

The null hypothesis of trace is that “at most” the  $r$  cointegration vector, with an alternative hypothesis of “more than”  $r$  vectors.

The maximum eigenvalue test:

$$\lambda_{max} = -T \cdot \ln(1 - \lambda_{r+1}). \quad (3)$$

Here, the null hypothesis of  $r$  cointegrating vectors is tested against the alternative hypothesis of  $r + 1$  cointegration vectors. In equations (2) and (3), the sample size and  $\lambda$  are the broadest canonical correlation.

#### 3.3.3. Panel Granger causality test

In the presence of cointegration among the variables, the specification of the Granger causality from the vector error correction (VEC) framework in the first difference form will result. This is done by inclusion of a year-lagged error correction term to act as a speed of adjustment to the long-run equilibrium.

Thus, the model for this research paper is specified as:

$$\begin{aligned} \Delta CIR_{it} = & \alpha_1 + \sum_{l=1}^p \beta_l \cdot \Delta CIR_{i(t-l)} + \\ & + \sum_{l=1}^p \beta_2 \cdot \Delta PER_{i(t-l)} + \\ & + \sum_{l=1}^p \beta_3 \cdot \Delta DTE_{i(t-l)} + \sigma_1 \cdot ECT_{t-1} + \varepsilon_{lit} \end{aligned} \quad (4)$$

**Table 1.** Panel unit root test at first difference I (1) for the variables

Source: researcher's computation (2017).

Variables	Levin, Lin & Chu t* Statistic	Prob	ADF statistic	Prob	PP statistic	Prob
CIR	-5.11447	0.0000*	76.9070	0.0000*	190.180	0.0000*
PER	-6.16977	0.0000*	61.5848	0.0006*	198.499	0.0000*
DTE	-13.2446	0.0000*	142.268	0.0000*	339.168	0.0000*

Note: \* represent significance at 1%.

$$\begin{aligned} \Delta PER_{it} = & \alpha_2 + \sum_{l=1}^p \beta_l \cdot \Delta PER_{i(t-l)} + \\ & + \sum_{l=1}^p \beta_2 \cdot \Delta DTE_{i(t-l)} + \\ & + \sum_{l=1}^p \beta_3 \cdot \Delta CIR_{i(t-l)} + \sigma_2 \cdot ECT_{t-l} + \varepsilon_{2it}, \end{aligned} \quad (5)$$

$$\begin{aligned} \Delta DTE_{it} = & \alpha_3 + \sum_{l=1}^p \beta_l \cdot \Delta DTE_{i(t-l)} + \\ & + \sum_{l=1}^p \beta_2 \cdot \Delta CIR_{i(t-l)} + \\ & + \sum_{l=1}^p \beta_3 \cdot \Delta PER_{i(t-l)} + \sigma_3 \cdot ECT_{t-l} + \varepsilon_{3it}, \end{aligned} \quad (6)$$

where *CIR* – cost-to-income ratio, *PER* – personnel ratio; and *DTE* – total debt to total equity ratio,  $ECT_{t-l}$  is the one year-lagged error correction term,  $\varepsilon_{1it}$ ,  $\varepsilon_{2it}$  and  $\varepsilon_{3it}$  are stochastic white-noise error terms. In each equation, the dependent variables are regressed against the past values of explanatory variables, which are the basic rationale for Granger causality test. Capital adequacy ratio (debt to total equity) is used in this paper as control variable to avoid bias and bogus relationships caused by omitting germane variables that the bivariate tests might fail to consider (Gujarati, 1995). The choice of capital adequacy is premised on the fact that total liabilities to total equity ratio are also key determinants of bank performance. Thus, this result will establish the direction of the causal relationship among the variables under consideration.

## 4. EMPIRICAL RESULTS

In econometric analysis, an attempt is usually, made to establish the existing relationship among various variables of interest. Due to this, the paper presents the evaluation of the causal

relationship between personnel ratio and CIR in Nigerian banks. This is done using cointegration and Granger causality tests to investigate whether there is a causal relationship between personnel ratio and CIR. To start with, a pre-test is conducted to determine the stationary level of the data using LLC, ADF and PP unit root tests.

These three tests, as used in the literatures, have confirmed that various unit root tests give various results depending on the power of the unit root (Akinlo, 2008; Sharifi-Renani, 2007).

### 4.1. Panel unit root test

The Panel unit root test presented in Table 1 shows that all the variables were stationary. The CIR, bank size, and debt to total equity ratio were all stationary at first difference (I (1)) at both cross section and individual level during the study period. This is evident from the probability of the Levin, Lin and Chu t-statistic values: 0.000, 0.000 and 0.000; and the augmented Dickey – Fuller (ADF) test statistic and Phillips – Perron (PP) statistic values: 0.000, 0.000 and 0.000 for each of the variables, which was less than the 5% significance level for the parameters estimation. Thus, it implies there is a short-run equilibrium relationship among the variables being investigated. The short-run stability of these variables, as revealed by the panel unit root test, led to the test of cointegration to determine the long-run equilibrium relationship or stability or the linear combination of the variables in the long run.

### 4.2. Cointegration test

The cointegrating rank test is estimated using Johansen methodology. Johansen's approach derives two likelihood estimators for the cointegrating rank: a trace test and a maximum eigenvalue test. The cointegrating rank was formally tested using the trace and maximum eigenvalue statistic.



**Table 2.** Cointegration rank test using trace statistic

Source: researcher's computation (2017).

Eigenvalue	Trace statistic	5% Critical value	Prob	Hypothesized No. of CE(s)
0.900844	407.1278	29.79707	0.0001	None*
0.201422	60.46875	15.49471	0.0000	At most 1*
0.163227	26.73036	3.841466	0.0000	At most 2*

Note: \* represents 1% level of significance.

**Table 3.** Cointegration rank test using maximum eigenvalue statistic

Source: researcher's computation (2017).

Eigenvalue	Maximum eigenvalue statistic	5% Critical value	Prob	Hypothesized No. of CE(s)
0.900844	346.6590	21.13162	0.0001	None*
0.201422	33.73839	14.26460	0.0000	At most 1*
0.163227	26.73036	3.841466	0.0000	At most 2*

Note: \* represents 1% level of significance.

These test statistics indicate three cointegrating vectors at the 5% level of significance, as presented in Tables 2 and 3. This implies that a long-run equilibrium relationship exists among the variables in the study. Thus, the stability of the bank personnel ratio and the debt to total equity ratio which captured the capital adequacy, will affect the efficiency of banking performance measured by CIR in the long run. Isik and Hassan (2002) agreed with this by asserting that bank size is an important driver of efficient performance in banking.

Table 4 presents the Johansen – Fisher panel cointegration among the variables. The Fisher Statistics for both trace and maximum eigenvalue tests revealed two cointegrating vectors or a linear combination of two cointegrating equations. Thus, the panel cointegration test also establishes the stability or equilibrium relationship between bank size, debt to total equity and CIR, which is a measure of efficient performance in banking in the long run. Following from this is the cointegration test on each cross section (the selected banks in this study). The result is presented in Table 5.

The result of vector error correction Granger causality between the financial variables under consideration was presented to show the direction of causal relation between CIR, personnel ratio and capital adequacy (debt to total equity). The result discovered that there is a unidirectional causality of error between CIR and personnel ratio, meaning that CIR of banks can cause the personnel expense ratio, while personnel expense ratio cannot cause CIR in Nigerian banks. There is also bi-directional causality between cost-income ratio and debt to total equity, even though capital adequacy measure (DTE) Granger causes CIR at 10%.

It was also revealed that there is a bidirectional causality between personnel ratio and capital adequacy ratio (debt to total equity) in both the short and long run. This is evident from estimated probability of Chi-square statistics values given as 0.000, 0.000,  $0.008 < 0.05$ . Thus, CIR Granger causes personnel ratio and capital adequacy ratio (debt to equity ratio). Surprisingly, personnel ratio and capital adequacy ratio (DTE) cannot cause bank performance measured by CIR in the long

**Table 4.** Johansen – Fisher panel cointegration test (CIR, BAZ, DTE)

Source: researcher's computation (2017).

Fisher stat.* (from trace test)	Prob.	Fisher stat.* (from max-eigen test)	Prob	Hypothesized No. of CE(s)
69.62	0.0001	109.5	0.0001	None*
3.128	1.0000	0.488	1.0000	At most 1
51.13	0.0094	51.13	0.094	At most 2*

Note: \* represents 1% level of significance.

**Table 5.** VEC Granger causality/block exogeneity Wald tests

Source: researcher's computation (2017).

Dependent variable: D (CIR)			
Excluded	Chi-square	D. f.	Prob.
D (PER)	1.064731	1	0.3021
D (DTE)	3.485099	1	0.0619*
All	3.600366	2	0.1653
Dependent variable: D (PER)			
D (CIR)	65.33393	1	0.0000***
D (DTE)	47.69934	1	0.0000***
All	88.70208	2	0.0000***
Dependent variable: D (DTE)			
D (CIR)	16.61739	1	0.0000***
D (PER)	11.31339	1	0.0008***
All	24.95653	2	0.0000***

Note: \*\*\*, \* denote 1% and 10% significance levels, respectively.

run – with a probability value of 0.1653 which is not significant even at the 10% level. Furthermore, in the long run, CIR and capital adequacy (debt to equity ratio) Granger cause personnel ratio at the 1% level of significance. The vector of CIR and personnel ratio Granger cause capital adequacy (debt to total equity) of banks at the 1% level of significance. In other words, knowing the vector of error from the CIR and capital adequacy ratio, the level of error because of the personnel ratio can be determined.

The result of the Granger causality among the financial variables under consideration was presented in Table 6 using F-statistics and probability value, to show the direction of causal relationship between each pair of the financial variables, such as the efficiency performance of the bank measured by CIR, bank personnel ratio, and debt to total equity ratio in Nigeria. From

the result, it was found there is a bidirectional causality between CIR and personnel ratio; CIR and debt to total equity; personnel ratio and CIR; personnel ratio and debt to total equity ratio; debt to total equity ratio and CIR, and debt to total equity ratio and personnel ratio. This is evident from the estimated F-statistics values given as  $10.104, 32.340, 7.354, 122.353, 15.855$  and  $79.947 > F_{0.95}(1, 150) = 3.92$ . Thus, personnel ratio Granger causes CIR and debt to equity ratio; CIR Granger causes personnel ratio and debt to total equity ratio; and debt to total equity Granger causes CIR and personnel ratio. In other words, banks' personnel ratio can be used to determine capital adequacy and CIR, which is the measure of banking performance. Thus, according to Bashir (1999), the larger the size (personnel) of a bank is, the more various wider-scale financial services it can render to the public, so maximizing wealth for stakeholders at a reduced unit cost.

**Table 6.** Pairwise Granger causality test result

Source: researcher's computation (2017).

Null hypothesis	Obs.	F-statistic	Prob.
PER does not Granger cause CIR	150	10.1037	0.0000***
CIR does not Granger cause PER	150	32.3397	0.0000***
DTE does not Granger cause CIR	150	7.3537	0.0262**
CIR does not Granger cause DTE	150	122.353	0.0000***
DTE does not Granger cause PER	150	15.8549	0.0000***
PER does not Granger cause DTE	150	79.9468	0.0000***

Note: \*\*\*, \*\*, \* represent 1%, 5% and 10% significance levels, respectively.



## CONCLUSION AND RECOMMENDATIONS

The study examined both the existence and direction of causality between personnel ratio and CIR (bank performance) of Nigerian banks – using 15 selected banks covering the period of 2004–2015. It was found that personnel ratio and debt to total equity, which is a measure of capital adequacy, Granger causes CIR (based on performance) of Nigerian banks and vice versa. This implies that bidirectional causality exists between the two variables. Evidence from unit root and cointegration tests shows there is stability of causal relationship among CIR-based performance in banking, personnel ratio, and debt to total equity. This implies that in both the short and the long run, Nigerian bank performance will be affected by the nature and the extent of its capital adequacy and personnel ratio. Thus, it is concluded that the CIR and capital adequacy of banks determine the staff strength of banks in Nigeria. Apparently, a satisfactory CIR prompts the intake of quality staff. However, proper care must be exercised as an increase in the number of staff leads to increased staff cost – which is a significant proportion of bank operating expenses. The engagement of quality and efficient staff at a minimized cost will go a long way towards improving their performance.

Therefore, the study recommends that the bank should enforce policies in the banking sector that will minimize unit cost of operation – even though they might hire more staff. This is to enhance the stability of the banks in Nigeria and to promote continued profitability devoid of high, unrecoverable debt, and to ensure good corporate governance, which is a panacea for effective operational efficiency of banks.

## AREAS FOR FURTHER RESEARCH

There are many factors influencing banks operational performance apart from the bank personnel ratio. Researchers interested in this area of study may focus on: management – the effects of management concentration on bank performance; and bank ownership – if there is a link between operational performance and the nationality of the bank (foreign or locally owned). It is well-known that banks are not the only financial institutions that need to be studied, and the research could also be carried out on other financial institutions in order to widen the scope of knowledge in this area.

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