EVALUATION OF THE DETERMINANTS OF OPERATIONAL EFFICIENCY IN NIGERIAN DEPOSIT MONEY BANKS

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Abstract

The aim of this paper is to evaluate the operational efficiency of deposit money banks with a view to identify its major determinants in Nigeria. Ratio analysis of a panel of six (6) deposit money banks covering period of 2004 to 2013 was used. The data used were derived from the Statement of comprehensive income and statement of financial position of banks listed on the Nigeria Stock Exchange. These data include the interest expenses, personnel expenses, customer deposits, total loan, total investment etc. Pooled OLS, Fixed Effect Model and various tests were employed. The results of analyses show that price of labour, total loan and total deposit has negative influence on banks operational efficiency. Based on the findings, Nigerian deposit money banks must as a matter of urgency embrace and invest in more sophisticated piece of technology in order to reduce their staff cost given its undesirable effect on operational efficiency. This must be accompanied by the employment of sound management team and credit officers with regular examination of banks asset book by the supervisory bodies.

Keywords: Ratio analysis; panel data; deposit money banks; financial ratio analysis: operational efficiency

INTRODUCTION

Determinants of operational efficiency in the banking sector has attracted the attention of researchers worldwide. They include Fung (2006) in USA, Paradi et al (2012) in Canada, Tailor et al (1997) in Mexico, Berg et al (1993) Norway, Kolari and Zardkoohi (1990) in Finland, Soteriou and Zenios (1999) in Cyprus, Koetter (2008) in Germany, Rezitis (2008) in Greece, Bos and Kool (2002; 2006) in Netherlands. Canhoto and Dermine (2003) in Portugal, Färe et al. (2006) in Spain, Rime and Stiroh (2003) in Switzerland, Matthews et al. (2007) in UK, Hasan and Marton (2003) in Hungary, Vernikov (2010) in Russia, Brown et al. (2009) in Kyrgyzstan, Havrylchyk (2006) in Poland, Jemric and Vujcic (2002) in Croatia and Chaffai (1997) in Tunisia just to mention but a few with the only recognized work in Nigeria being Zhao and Murinde (2011).

While efficiency ratio or asset utilization ratio generally measures the efficiency of management in the use of the assets at its disposal, operational efficiency specifically measures how efficiently firm's product has been produced, held and distributed. According to Funso Kolapo (2006), a firm that is not operationally efficient would fail to achieve satisfactory return on owners equity and find it difficult to survive adverse economic conditions. Like other firms, banks are not charitable organizations and are out to maximize shareholders wealth. This measure compares the ability of banks to transform inputs into financial products and services at a lower cost relative to revenue generated from operation. The concept of operational efficiency is crucial for bank survival especially when one considers the fact that banks are service organizations with overhead constituting the most significant cost. Worthy of note is the fact that banks generate significant proportion of their income through interest revenue on loans and advances and customers' deposits constitute significant proportion of this lending hence the need to ensure safety is paramount. If an operationally inefficient bank is not safe, it is necessary to critically evaluate bank's operational efficiency in this part of the world where depositors confidence in the banking sector is low by looking at the inputs and outputs of the banks.

With wide use of Data Envelopment Analysis in most of the existing studies in this subject area, this article will contribute to knowledge by measuring the operational efficiency of banks applying the accounting approach of financial ratio analysis. This approach according to Hussain (2014) is known for simplicity, easy understandability, comparability and its intuitiveness. The study will also widen the horizon of the existing works in Nigeria. This article is structured into five sections. The next section contains a review of literature, followed by methodology, data analysis and discussion of findings and lastly, the concluding remarks.

LITERATURE REVIEW

Concept of Operational Efficiency

Deposit money banks play an important role as financial intermediaries for savers and borrowers in an economy. All sectors depend on banking sector for their very survival and growth. Operational efficiency of banks is therefore essential for a well-functioning economy. Operational efficiency is simply defined as the ability to deliver products and service cost effectively without sacrificing quality. Shawk (2008) defined operational efficiency as what occurs when a right combination of people, process and technology come together to enhance the productivity and value of any business operation, while driving down the cost of routine operations to a desired level. According to Beck, Loayza and Levine (2000), Efficiency in intermediation of funds from savers to borrowers enables allocation of resources to their most productive users. The more efficient a financial system is in such resource generation and in its allocation, the greater its contribution to productivity and economic growth.

According to Chen (2001), Efficiency in banking has been defined and studied in different dimensions including: (i) scale efficiency (ii) Scope efficiency and (iii) Operational efficiency, a wide concept sometimes referred to as x-efficiency. While Scale and scope economies for example, are achieved from the firms' output expansion resulting in an increase in the industry's output and that reduces costs of production thus leading to the strong technological external economy. A bank has the scale efficiency, when it operates within the range of constant return to scale. Scope efficiency comes into play when the bank operates in different numerous locations. Operational efficiency refers to the efficient utilization of human and material resources or the efficient use of people, machine tools and materials funds. Better utilization of any or a combination of these three, can increase output of goods and services and reduce costs. Operational efficiency is the tactical planning of an organization to maintain a safe balance between cost and productivity. It identifies the wasteful processes that contribute to loss of resources and organizational profits. It deals with minimizing waste and maximizing the benefits of resource to provide better services to the customers. For effective competition, lowering costs is a best option as internal wastage enhances more cost. Any input that is not processed through system so as to generate useful output is waste. It means producing more goods and services with no greater use of resources or maintaining the same level of production using fewer resources.

Empirical Literature

Sharma, Raina and singh (2012) employed panel data through stochastic frontier analysis model to measure the source of technical efficiency of Indian banking sector. The major

determinant of technical efficiency as revealed by the study are fixed asset, deposit and deposit to total liabilities while the cash deposit ratio is not insignificant. In a study on the determinants of operating efficiency in Egypt banking sector, Armer, Mustapha and Eldomiaty (2011) found asset quality, capital adequacy, credit risk and liquidity as the main determinants of efficiency in the highly competitive banks. Using non parametric approach of measuring efficiency by focusing on total factor productivity in the measurement of the determinant of efficiency in the central Asian banks between 2003-2006, Djahlilor and Piesse revealed that majority of the banking organization are efficient and that the inefficiency observed in some of the central Asian banks are traceable low capital adequacy, poor asset quality and low profitability. Employing Data Envelopment Analysis, it is evident that the main sources of efficiency in Nigeria banking sector is market size and the banking sector is not efficient in the pre and post liberalization period because of the distribution in the financial system. (Obafemi, Ayodele and Ebong 2013). There is a negative relationship between bank efficiency and profitability (Ismail, Rahim and Abdul Majid 2011; Amar *et al* 2011; Adewoye and Omoriegie 2013; Oke and Polodmine 2012). Islamic banking group are more efficient in resources allocation while commercial banks are technically efficient. Like in Nigeria, Abrahim *et al* (2011) identified size or scale of operation as an important determinant of bank efficiency in maylasian banking sector (see also Adewoye and Omoriege 2013). In Mexico, Garza- Garcia (2009) using Data Envelopment Analysis, concluded that loan intensity growth rate of GDP and foreign ownership are better predictors of bank efficiency while non interest expenses, non performance loan and inflation rate impede bank efficiency.With the use of Non parametric Data Envelopment Analysis, Inefficiency in Tazanian banks could be traced to inadequate long term capital, poor remuneration, poor management capacity and excess liquidity in terms of technical efficiency. Foreign banks take the lead followed by small and large domestic banks while small banks are scale efficient followed by foreign and large domestic banks respectively (Aikaeli 2008).Efficiency can be improved through investment in new piece of technology. Financial market in India is dominated by public banks and the ranking revealed that they are the most efficient compared to private banks. However, banking sector in India is characterized by fluctuation in the level of efficiency (Karmzadeh 2012). Consequent to rising number of bank customers, there has been a significant growth in the Jordanian Islamic banks with a concomitant increase in innovation efficiency. Ajloumi and Omari (2009),using both Data Envelopment and financial ratio analysis found that the most profitable banks faced higher risk which makes them operationally inefficient.

According to Ines Ayadi (2013), studying the determinants of Tunisian bank Efficiency using Data Envelopment Analysis, it was discovered that market share in Tunisian banks has

inverse impact on their efficiency. Quality of asset suggests that most banks engage in risky activities including credit. In the study, high ratio of quality of asset has negative effect on efficiency because it shows a small yield of bank assets. Tunisian banks tend to be less efficient because they suffer from under evaluation of credit risk and misallocation of resources. Therefore, it was denoted that the cost of the Tunisian banks increases with non performing loans. Employing Data Envelopment fixed effect regression analysis by Sarchez, Hassan and Bartkus (2013), efficient banks in Latin American capitalize earnings in liquidity because the ratio of loan loss reserve to gross loan is negatively related to efficiency and banks with low quality loan are expected to have low efficiency. Also, Kamarudaddin and Rohani (2013) in their Data Envelopment analysis of efficiency in Malaysian Islamic banks found that size of banking operation, asset quality improves operational efficiency as opposed to corporate social responsibility which is negatively related to cost/operational efficiency(see also Rozzani, Rashidah and Rahman,2013). Malaysian banks will be more efficient if they can control non-performing loans, the high cost of maintaining loan default will be avoided. Similar method was used by Endri and Divilestari (2014) where it was noted that variable of interest rate is inversely related to technical efficiency and the rate of inflation on the contrary is has positive relationship with banks operational efficiency. In conjunction with other studies, Ahmad and Noor (2011) in their study of determinants of Efficiency and profitability of World Islamic banks using the non-parametric Data Envelopment Analysis denoted that bank size and capital adequacy has direct relationship with bank efficiency, while loan intensity gives an indirect relationship, which means banks with higher loan to total asset ratio tends to exhibit lower efficiency level. Also, Wang, Zhou and Yan (2012) in their analysis of banking efficiency from an international perspective found that Asset quality and GDP shows a direct relationship with bank efficiency which is contrary to the findings of Kwan and Eisenbeis (1995)Moreover, in the study of Canadian banks efficiency by Allen and Engert (2007) using Data Envelopment Analysis, it was found that Canadian banks has increasing return to scale which denotes that Canadian banks have tended to move closer to the efficient frontier over time, and cost efficiency is comparatively low suggesting that Canadian banks are relatively efficient according to this measure

METHODOLOGY

Data Sources and Description

The data used for the study are secondary in nature. They are obtained from annual audited account and financial report of banks published in the Nigerian Stock Exchange fact book. A panel data of six banks covering a period of ten years was employed. The selected six (6) banks was randomly picked from the 15 quoted banks in Nigeria for easy accessibility of data.

Also, this study followed Sealy and Lindley (1977) approach that used an accounting balance-sheet approach to distinguish which accounts should be considered as inputs and outputs respectively. They argued that all liabilities (deposits and loans) and financial equity capital should be treated as outputs. The six variables chosen compared the input and output of banks so as to evaluate the operational efficiency of banks in Nigeria.

The dependent variable is Operational Efficiency ratio which is defined as:

OE = Operating expense / operating income

The explanatory variables representing input are Price of Labor, Price of Deposit and Price of Consumption. They are defined respectively as:

PL = Personnel expenses/total assets

PD = Customers deposit over total value of deposits

PC= Operating expense/ Total asset

The variables measuring output of banks are; Investment, Total deposit and Total loan.

Estimation Technique and Model Specification

Pooled Least Square

Panel Data Regression technique was preferred given its superiority over pure cross section or pure time series. The selection of variables for the estimated model was guided by relevant theories and existing empirical studies on the subject. The model is specified thus:

$OE_{it} = \alpha + \beta_1 PL_{it} + \beta_2 PPD_{it} + \beta_3 PPC_{it} + \beta_4 INV_{it} + \beta_5 TL_{it} + \beta_6 TD_{it} + £_{it}$ .... (1)

Where

i = 1, 2, ...6

t = 1, 2, ...10

PL = Price of Labour

PPC = Price of consumption

PPD = Price of deposit

INV = Total investment

TL = Total loan

TD = Total deposit

£ = Stochastic error term

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5,$ and β_6 are Regression parameters, also, the slope of each variable. On a priori each slope coefficient (i.e. $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5,$ and β_6) is expected to have a positive relationship with bank operational efficiency

ANALYSIS AND FINDINGS

Pooled Regression Result

Table 1: Summary of Pooled Least Square Result

Variables	Coefficients	Standard Error	Probability
PL?	-0.173398	0.076602	0.0276
PPC?	0.483421	0.119881	0.0002
PPD?	0.250374	0.218839	0.2576
INV?	-0.000236	0.021813	0.9914
TL?	0.123034	0.082400	0.1412
TD?	-0.152867	0.062487	0.0177

R^2 = 0.516344   **Adj R^2 = 0.471561   DW-STAT = 1.002**

Note: Computation Using E-Views 7 Statistical Package

Table 1 shows the relationship between the dependent variable (OE) and the independent variables (PL, PPC, PPD, INV, TL and TD). This relationship can be expressed mathematically as:

OE = -0.17339PL + 0.483421PPC+ 0.250374PPD- 0.000236INV + 0.123034 TL - 0.15286 TD

The above equation shows that there exists a negative relationship between PL and OE. Holding PPC, PPD, INV, TL and TD constant, a unit increase in PL will bring about a reduction of 0.17339 in OE. Similarly, there is a negative relationship between INV and OE such that a unit increase in INV leads to 0.000236 unit reduction in OE, all other factors being equal. It can be seen that OE is a decreasing function of TD. A unit rise in TD will cause a fall in OE by 0.15286 unit.

However, if all other factors are held constant, a unit increase in PPC, PPD and TL tend to increase OE by 0.483421, 0.250374 and 0.123034 unit respectively. The probability value shows that only PL, PPC and TD are significant in determining OE. Coefficient of multiple determination of adjusted R^2 of 0.47 revealed that the explanatory variables can only explain 47% of variations in OE. Durbin Watson statistics of 1.002 shows a presence of serial correlation. These lead to FEM estimation.

Fixed Effect Model (FEM)

Table 2:   Summary of Fixed Effect Model Result

Variables	Coefficients	Standard Error	Probability
C	-11.57215	14.31624	0.4229
PL?	-0.214168	0.081736	0.0117
PPC?	0.477967	0.098573	0.0000
PPD?	6.124615	7.378896	0.4106
INV?	0.020208	0.021985	0.3626
TL?	-0.221706	0.406072	0.5876
TD?	-0.135862	0.073808	0.0718
Fixed Effects(Cross)			
GTBB	-0.196968		
ZENB	0.064687		
SKYB	0.120920		
FIRB	0.003746		
ACCB	0.013149		
DIAB	-0.005534		

R^2 = 0.740414   **Adj R^2 = 0.680925 F-STAT = 12.44633**   DW-STAT= 1.837051

Note: Computation Using E-Views Statistical Package

It can be seen from table 2 that the constant parameter has a negative effect on OE. However the differential intercepts are only negative on GTBB and DIAB but positive on other banks. As in the Pooled OLS, PL and TD have significant negative effect on banks' OE. A unit rise in PL and TD will bring about 0.196968 and 0.005534 unit reduction in OE respectively. It must be noted that PPC and PPD maintain positive, significant and insignificant impact on OE. While INV relationship with OE is now positive, it remains insignificant. FEM shows that TL has a negative but insignificant effect on OE. Comparing the Pooled OLS and FEM results, there is a significant improvement in adjusted R^2 as PL, PPC, PPD, INV, TL and TD can now explain 68% of the total changes in OE. As if that is not enough, the FEM has corrected the observed serial correlation in Pooled OLS as shown in Durbin Watson statistics of 1.84. F statistics probability value (0.0000) of less than 5% shows the overall model is of good fit. The observed improvement informs the use of FEM model results for the further discussion and recommendation

DISCUSSION AND IMPLICATIONS OF FINDINGS

The broad objective of the study is to evaluate the operational efficiency of banks by showing the relationship between the inputs and outputs of banks so as to know which of them actually have strong effect on bank operational efficiency. Our findings revealed that Price Labor, Total

Loan and Total Deposit have negative influence on operational efficiency with only Price Labor significant at 95% level of confidence. This Price Labor is measured by the ratio of personnel expenses to total asset, which shows that these banks spend much on the staff cost and much percentage of their asset base are used to pay their staff. This has a significant inverse effect on them and reduces the level of their operational efficiency. Results of our study also revealed that Total Loan and Total Deposit in the output section also pose inverse effect on banks operational efficiency. This simply means that the total loan and advances in conjunction with total deposit either due from customers or from other banks are of little importance in determining the operational efficiency of banks and its even bringing it down. This implies that the amount banks give out as loan is too exorbitant and there are likely defaults in their repayment. Also, the deposits which actually constitute what banks trade with showed a negative influence and this implies that the money taken by banks as either demand deposits, saving deposits and time deposits are not well utilized to broaden up the asset base of the banks. Deposits constitute a substantial proportion of banks resource and capital, hence the more deposit a bank is able to mobilize; the more capital will be made available. The result in conflict with the a priori expectation consistent with the findings of Anastoisis et al (2012) and Karmzadeh (2012), differences in methodology notwithstanding. On the contrary, Price of consumption, Price of deposit and Investment have a positive relationship with operational efficiency. This implies that the amount of routine expenses covered by total asset of banks is substantial to the overhead structure of banks. Its significance however further confirms the important role played by labor or employee in Nigerian banking sector. The insignificance of PPD as price of input confirms that little cost is incurred by Nigerian banks in the mobilization of deposits. This is true as banks only offer negligible interest on various customer deposits, an indication of customer exploitation in an oligopolistic banking industry. INV are not significant but positively related to banks' operational efficiency. Banks should not dwell much on investment securities as the stock market has witnessed recession and its of less value.

CONCLUDING REMARKS

This study evaluated the operational efficiency of deposit money banks in Nigeria. The regression results for the models revealed that there exists either positive or inverse relationship between operational efficiency and banks input and output variables. The following recommendations are made based on the empirical findings: While Nigerian banking industry is undergoing a technological innovations with the hype of electronic banking and recent introduction of cashless policy, Nigerian deposit money banks must as a matter of urgency embrace and invest in more sophisticated piece of technology in order to reduce their staff cost

given its undesirable effect on operational efficiency. The failure of banks management and credit officers to abide by the banks' credit guidelines in the consideration of loan proposals results in rising incidence of bad and non performing loans and consequent adverse effect of total loans on operational efficiency. This also explains the negativity of total deposit coefficients as poor loans or assets implies imprudent use of deposits so mobilized. Employment of sound management team and credit officers with regular examination of banks asset book by the supervisory bodies is a way out of this menace. High value of intercept implies that there are other variables outside the model that affect operational efficiency. Proper and adequate attention should be given to other variables and Indices that can influence operational efficiency aside from input and output of banks as specified by Sealy and Lindley (1977).

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APPENDICES

Appendix I: Pooled OLS Result

Dependent Variable: OE?

Method: Pooled Least Squares

Date: 12/15/14   Time: 12:48

Sample: 2004 2013

Included observations: 10

Cross-sections included: 6

Total pool (balanced) observations: 60

Variable	Coefficient	Std. Error	t-Statistic	Prob.
PL?	-0.173398	0.076602	-2.263638	0.0276
PPC?	0.483421	0.119881	4.032510	0.0002
PPD?	0.250374	0.218839	1.144098	0.2576
INV?	-0.000236	0.021813	-0.010797	0.9914
TL?	0.123034	0.082400	1.493131	0.1412
TD?	-0.152867	0.062487	-2.446387	0.0177
R-squared	0.516344	Mean dependent var		-0.512145
Adjusted R-squared	0.471561	S.D. dependent var		0.195771
S.E. of regression	0.142314	Akaike info criterion		-0.966926
Sum squared resid	1.093673	Schwarz criterion		-0.757491
Log likelihood	35.00777	Hannan-Quinn criter.		-0.885004
Durbin-Watson stat	1.002234			

Appendix II: Fixed Effect Result

Dependent Variable: OE?

Method: Pooled Least Squares

Date: 12/15/14   Time: 12:51

Sample: 2004 2013

Included observations: 10

Cross-sections included: 6

Total pool (balanced) observations: 60

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-11.57215	14.31624	-0.808324	0.4229
PL?	-0.214168	0.081736	-2.620229	0.0117
PPC?	0.477967	0.098573	4.848881	0.0000
PPD?	6.124615	7.378896	0.830018	0.4106
INV?	0.020208	0.021985	0.919174	0.3626
TL?	-0.221706	0.406072	-0.545977	0.5876
TD?	-0.135862	0.073808	-1.840748	0.0718
Fixed Effects (Cross)				
GTBB--C	-0.196968			
ZENB--C	0.064687			
SKYB--C	0.120920			
FIRB--C	0.003746			
ACCB--C	0.013149			
DIAB--C	-0.005534			
	Effects Specification			
Cross-section fixed (dummy variables)				
R-squared	0.740414	Mean dependent var		-0.512145
Adjusted R-squared	0.680925	S.D. dependent var		0.195771
S.E. of regression	0.110585	Akaike info criterion		-1.389212
Sum squared resid	0.586992	Schwarz criterion		-0.970343
Log likelihood	53.67635	Hannan-Quinn criter.		-1.225369
F-statistic	12.44633	Durbin-Watson stat		1.837051
Prob(F-statistic)	0.000000			