

An Empirical Analysis of Allocative Efficiency of Nigerian Commercial Banks: A DEA Approach

Usman Owolabi Akeem

Department of Management and Accounting,
Ladoke Akintola University of Technology, Ogbomoso, Nigeria.
Email: labisky@yahoo.com

Fadipe Moses

Department of Management and Accounting,
Ladoke Akintola University of Technology, Ogbomoso, Nigeria.
Email: mosesfadipe@yahoo.com

ABSTRACT: This paper investigated an empirical analysis of allocative efficiency of Nigerian commercial Banks between the years 2002 to 2011. Ten Nigerian Banks were randomly selected out of 15 banks operating in Nigeria. For this intention, the Data Envelopment Analysis (DEA) model was used with three input variables (deposits, operating expenses, and assets) and four output variables (loan and advances, investment, Interest income, and non-interest income). The mean allocative efficiency, for the period examined stood at 0.896 (89.6%). This mean result depicted the fact that Nigerian banking sector generally needs managerial attention beyond the emphasis on continual banking reforms of recapitalization, merger and acquisition and the likes so as to be ranked with the global perspective.

Keywords: Data Envelopment Analysis; Allocative efficiency; Decision-Making Units; Financial Intermediation;

JEL Classifications: C22; G22; L12

1. Introduction

Activities (banking products) of banking industry in the developed and developing countries have long been seen for its impact as a channel of monetary policy transmission. Firms in these countries rely heavily on bank lending to finance their business pursuits. Therefore, empirical analysis of allocative efficiency of commercial banks remains significant in Nigeria especially to evaluate the influence of the several reforms we have had.

The significance of banking sector in the economic and financial development of any nation is highly frightening and that is why allocatively efficient banking sector is necessary for better usage of financial resources of a nation. Economic and financial development can be achieved only by using the available resources in a better way and hence improving the output performance. When one talks about brilliant utilization of any given resource, the very fundamental concept that comes to one's sense is of "Efficiency". In order to allocate resources efficiently, banks should be sound, dynamic and efficient in identifying the right set of opportunity-based products. Therefore, efficiency remains an important issue in Nigeria, in all other developing countries and even in the developed countries to guarantee the smoothness of the monetary policy transmission process and also to provide better pricing and services to the banking customers.

Nigerian Banking sector comprises of commercial banks, merchant, mortgage and microfinance banks. These banks evolved to achieve economies of scale in order to offset the costs of collecting and processing information designed to reduce uncertainty, thereby facilitating a more efficient allocation of financial resources. In an ideal economy, banks tend to act as quality controllers for capital seeking-projects, ensuring higher returns and accelerating output. However a competitive banking system is required to ensure that banks are effective forces for financial intermediation, channeling savings into investment and fostering higher economic growth.

The term “Efficiency” refers to the maximizing of outputs in such a way the input resources are less utilized. Banking efficiency is defined as difference between observed quality of input and output variables with respect to optimal quality of input and output variables. The efficient banks can achieve a maximum value of ONE in comparison to inefficient banks can reduce to level of ZERO. Haseeb et al. (2010) whereas allocative efficiency refers to when inputs, for a given level of output and set of input prices, are chosen to minimize the cost of production, assuming that the organization being examined is already fully technically efficient by Bhagavath (2006). It also means optimally allocating resources to the production of different sets of goods in such a way that the productivity is maximized (Stuart et al., 2009). It also refers to whether inputs, for a given level of output and set of input prices, are chosen to minimize the cost of production, assuming that the organization being examined is already fully technically efficient. Allocative efficiency is also expressed as a percentage score, with a score of 100% indicating that the organization is using its inputs in the proportions that would minimize costs. An organization that is operating at best practice in engineering terms could still be allocatively inefficient because it is not using inputs in the proportions which minimize its costs, given relative input prices as empirically postulated by Farrell (1957).

This paper evaluates the allocative efficiency of Nigerian commercial banks, most importantly, to assess their efficiency, productivity, growth and over the period of 2002–2011, if the banking reforms and re-capitalization of recent time have impacts on Nigerian banks. Data Envelopment Analysis (DEA) was used for this work. In addition, the results of the study found out whether the financial intermediation role of the banks have been yielding expected results evenly among the Nigerian banks with the use of both input and output resources. And if they have benefited mostly from expansion via economies of scale, while on the other hand, the results also found out the inefficient banks allocatively, if shrinking them together with the efficient banks in order to benefit from scale advantages will be more beneficial.

Allocative efficiency is a very basic determinant in arriving at the cost efficiency which means efficient distribution of resources. Resources of any organization (banks in this case) can be divided into two which are financial resources and human resources that are to be mixed accordingly and properly to determine how high the allocative efficiency will be. Getting workforce that will reach bank’s customers profitably has been a challenge in Nigerian banking sector. Sanusi (2012) said a key challenge is how to get quality manpower: real strategic change can only take place with competent and committed workforce that is constantly exposed to training and development. The competitive financial sector environment requires a highly skilled workforce that would effectively contribute to value creation within financial institutions. Hitherto, employee recruitment was merely to comply with regulatory requirements, while training was viewed as a non-revenue function that was costly and unnecessary. Selection of input- mix is also paramount, even if the expected manpower is in place. Njuguna (2007) was of the opinion that the evaluation of banks’ efficiency creates several problems which arise as a result of the function of financial intermediaries, especially as banks are multi-product industries that do not produce or market physical products. One of the major problems in the study of bank efficiency is the specification of bank inputs and outputs. There has been long-standing disagreement among researchers over what banks produce. The most debatable issue is the role of deposits and, more specifically, whether they should be treated as inputs and outputs. Some researchers such as Elyasiani and Mehdian (1990), and Lang and Welzel (1996), treat them as inputs, but researchers such as Berger and Humphrey (1991), and Ferrier and Lovell (1990), treat deposits as outputs while other researchers such as Humphrey (1990) and Aly *et. al.* (1990) treat them simultaneously as inputs and outputs.

The general objective of the study is to empirically evaluate the allocative efficiency of commercial banks in Nigeria. To achieve this, the following specific objectives were proposed:-

- To measure the relative allocative efficiency of commercial banks in Nigeria.
- To evaluate effectiveness of man-power planning among Nigerian commercial banks.

2. Review of Empirical Literature

A host of several studies evaluating efficiencies in diversities of banks or finance houses evolved in Nigeria and other countries of the world. Those studies came up to measure the following efficiencies through the parametric and non-parametric approach; Technical efficiency. Allocative efficiency, Cost efficiency, Scale efficiency, profit efficiency etc. the following researchers came out

with peculiar results that were pertinent with the areas in which they carried out the studies and are closely related with this study.

Izah et al. (2009) evaluated the efficiency of Malaysian banks using data envelopment analysis. Overall, pure technical and scale efficiencies were estimated for seven years, during 2000-2006. The results suggested that domestic banks were relatively more efficient than foreign banks. The results also suggested that domestic banks' inefficiency were attributed to pure technical inefficiency rather than scale inefficiency. In contrast, foreign banks inefficiency is attributed to scale inefficiency rather than pure technical inefficiency.

Tanko (2008) measured and decomposed efficiency using the non-parametric approach popularly known as Data Envelopment Analysis (DEA) and productivity growth using Malmquist Productivity index (MPI), in a sample of Nigerian commercial banks over the period of 5 years. Under the Constant Return to Scale assumption, the average efficiency of all the banks over the 5-year period showed a constant improvement. It was therefore concluded that banks need to do more in terms of maintaining their level of efficiency.

Majid (2012) examined the efficiency of Indian commercial banks during 2000 – 2010 by utilizing Data Envelopment Analysis (DEA). Based on the sample of 8 commercial banks, our findings reveal that the mean of cost (economic) efficiency, technical efficiency, and allocative efficiency are 0.991, 0.995, and 0.991 in VRS model and 0.936, 0.969 and 0.958 in CRR model, respectively using DEA approach. The results suggested that Bank of India and ICICI bank are more efficient as compare to other banks in India and result confirmed that selected Public Sector Banks are more efficient than Private sectors during the study period in India.

Selcuk and Tuba (2006) measured and evaluated the efficiency of commercial banks in Turkey using a Data Envelopment Analysis (DEA) and Malmquist Productivity Index (MPI) methodologies. For this purpose, two outputs representing total loans and non-interest income, and four inputs representing the number of employees, physical capital, non-deposit funds and total deposits are selected for a two-year (2003-2004) period in the analysis. Using data for the year 2004, 11 of the 31 banks are found to be efficient under CRS, while 16 of them efficient under VRS assumption. Also, for the year 2003, 16 of the 31 banks have been calculated efficient under CRS while 23 of them efficient under VRS assumption. In addition to efficiencies of banks, it has been found that there is an increase of bank's efficiency changes over the time period of 2003- 2004.

Usman and Akinlo (2010) Sought to investigate the problem of inefficiency in the Nigerian insurance market from the perspective of their cost structures. The study used the secondary data of financial reports of thirty randomly selected insurance firms which spanned over a period of ten years and applied transcendental logarithm model to evaluate their performance from the cost structures strategy. The results indicated that only large scale firms sampled belong to this category. The result suggested that premium income would contribute to insurance form's performance, only when a sound investment decisions are made. Usman (2009) also made use of Cobb–Douglas cost and profit functional models to investigate performance of randomly selected insurance firms. It could be seen from the result that there was inverse relationship between the cost of labour and the firms' profit, which means that as the cost of labour used in the day today activities of the firms increased, there would be an increase in the total cost of production and there by the level of profitability of the firms reduced. The outcome suggested that a few insurance firms in Nigeria mostly do not pay claims; therefore, establishing reasons why there is apathy for insurance services among insuring public. Labour price was significant in this study, but showed an inverse relationship with business performance.

Supachet (2008) examined the relative efficiency of Thai commercial banks during 2003–2006 by utilizing Data Envelopment Analysis (DEA). Based on the sample of 13 commercial banks, our findings reveal that the efficiency of Thai commercial banks via operation approach is very high and stable while the efficiency via intermediation approach is moderately high and somewhat volatile. In term of size, large, medium and small banks, in average, are efficient via operation approach with the average efficiencies of 100%. However, small banks are the most efficient banks via intermediation approach

Alese et al. (2006) focused on measuring technical efficiency of internet service providers in Western Nigeria by using stochastic Trans log frontier model as a relationship among certain network characteristics taken in as inputs in the day-to-day provision of services. Consequently, an internet

service model Estimation Questionnaire' was designed and ministered to a total of 203 randomly sample internet service providers in order to collect data about these network characteristic. A comparative analysis of estimations from the two models was carried out. The hypotheses that the Cobb-Douglas model adequately represented the data were accepted in both methods. However, it was found that although the means technical efficiency is high (about 91.2%), wide variation of about 64.9% exists between the lowest and the highest technical efficient service.

Njuguna (2007) the study examined revenue, cost and profit efficiency for Kenyan banks between 1998 and 2006. The DEA methodology was used that resulted into the following findings which established that the banks showed declining cost efficiency over the sample period whereas the revenue efficiency was on a gradual increase. Malmquist total factor productivity (TFP) index showed that technical efficiency and technological efficiency were the main drivers of profit efficiency in the banking industry. It also established that there exists a significant relationship between stock returns and changes in both cost and profit efficiency for the listed commercial banks. Cost efficiency influence stock returns of banks since poor cost management lowers banks' profits. Poor profits lead to low future dividends to investors. Consequently, the share price will be bid down at the stock market. Conversely, a bank which efficiently mobilizes its deposits, other funds and staff earns high profits, translating into high dividends to investors and the share will be highly priced which implies high stock returns.

Sufian (2004) computed the technical and scale efficiency of domestic incorporated Malaysian commercial banks during the merger year, pre-and post-merger period. It was found that Malaysian banks exhibited a commendable overall efficiency level of 95.9% during 1998-2003. However, the suggested minimal input waste was 4.1%. The results suggested that the merger programme was successful, particularly for the small and medium size banks, which have benefited from the merger and expansion via economies of scale.

Muhammad (2010) assessed efficiency of commercial banks across Pakistan from 2001 to 2006 by using Data Envelopment Analysis (DEA). The average efficiency scores of banks across Pakistan appear to be low. Foreign banks tend to perform better than those of the local banks in Pakistan, both private and public. However, private local banks perform better than those of their counterparts in the public sector. Area of inefficiencies were attributed to concentrating on servicing the retail markets only, existence of competition in the banking industry, rising interest rates, higher levels of non-interest and administrative expenses, pursuing less sophisticated investment strategies, and providing less competitive managerial services to their clients.

Hassan (2006) investigated relative efficiency of the Islamic banking industry in the world by analyzing a panel of banks during the period of 1995-2001. Both parametric (cost and profit efficiency) and nonparametric (data envelopment analysis) techniques were used to examine efficiency of these banks. Five DEA efficiency measures such as cost, allocative, technical, pure technical and scale efficiency scores were calculated. The results indicated that, on average; the Islamic banking industry is relatively less efficient compared to their conventional counterparts in other parts of the world. The results also showed that these efficiency measures are highly correlated with ROA and ROE, suggesting that the efficiency measures can be used concurrently with conventional accounting ratios in determining Islamic bank performance.

Ali et al. (2002) examined several efficiency measures and productivity changes of banks in the case of Kuwait using the DEA approach. The results indicated that cost efficiency of Kuwaiti banks averages about 68%, implying that about 47% of banks' resources in Kuwaiti are not optimally processed. The results also suggested that the inefficiency sources are both allocative (regulatory), as well as technical (managerial). Significant allocative inefficiency implies that Kuwaiti banks do not use the proper input mix, while the observed technical inefficiency is likely due to operating off the efficient frontier.

3. Method of Data Analysis

The method that will be used for this research is Data Envelopment Analysis (DEA). DEA is an increasingly popular management tool. DEA is commonly used to evaluate the efficiency of a number of producers. The DEA approach was pioneered by Charnes et al. (1978) and later extended by Banker et al. (1984). DEA decomposes cost (input saving) efficiency into technical and allocative efficiencies. It also allows the decomposition of technical efficiency.

The DEA approach refers to the ability of banks to control cost and generate revenue and it is a linear programming based technique for measuring relative efficiency and management performance of firms where presence of multiple inputs and outputs make comparison difficult. It uses observed values of inputs and outputs and attempts to find which of the firms in the given sample determine an envelopment analysis. Widespread usage of DEA for examining scale economies is because it requires no explicit specification of functional form. It is practically difficult to parametrically specify and estimate a production or cost function for the banking business because deregulation and advances in technology hence brought many outputs other than the traditional output loans (Harada and Ito 2005).

DEA serves as an alternative to regression technique since regression is based on central tendencies, while DEA is based on extreme observation. Moreover the merit with the DEA is that unlike regression analysis. It does not require a prior assumption about the analytical form of the production function; instead it derives the best production function solely on the basis of observed values making it impossible to misspecify the production technique.

The efficiency scores were based on the CCR model of DEA.

Charnes, Cooper and Rhodes- Model:

CCR- Model is introduced by Charnes et al. (1978). This model measures the efficiency of each DMU which is obtained as a maximum of a ratio of total sum of weighted output to total sum of weighted inputs.

The weight for the ratio are determined by the restriction that the similar ratios for every DMU have to be less than or equal to unity. Therefore, the efficiency score is a function of the weights of the “Virtual” input- output combination. Suppose that there are n DMUs, each within input and output, relative efficiency score of a given DMU is obtained by solving the following linear programming model.

$$max\ ho(u, v) = \frac{\sum_{r=1}^s u_r y_{ro}}{\sum_{i=1}^m v_i x_{io}} \tag{1}$$

- s = number of outputs;
- u_r = weight of output r;
- y_{ro} = amount of output produced by the DMU
- m = number of inputs
- v_i = weight of input i; and
- x_{io} = amount of input i used by the DMU

Equation 1 assumes constant returns to scale and controllable inputs, while both inputs and output can be measured and entered in this equation without standardization, determining a common set of weights can become difficult. DMU might assess output and inputs quite differently. The CCR model takes into account this concern.

Subject to

$$Max\ ho(u, v) = \frac{\sum_{r=1}^s u_r y_{rj}}{\sum_{i=1}^m v_i x_{ij}} \leq 1 \text{ for each DMU in the sample } \tag{2}$$

Where $j = 1-----n$ (number of DMUs)

- x_{ij} = The amount of input i utilized by the jth DMU
- y_{ij} = The amount of output r produced by the jth DMU
- v_i = weight given to input i
- u_r = weight given to output r

To measure efficiency, equation 2 is converted into the more familiar components of a linear programming problem. In equation 3, the denominator is set to a constant and the numerator is maximized.

$$\begin{aligned}
 \text{Max } h_o &= \frac{\sum_{i=1}^m v_r x_{io}}{\sum_{r=1}^s u_r y_{ro} - \sum_{r=1}^s u_r y_{rj} - \sum_{i=1}^m v_r x_{ij}} \leq 0 \\
 \text{Subject to:} & \\
 u_i \geq 0; i &= 1, 2, \dots, m \\
 y_{ri} \geq 0; r &= 1, 2, \dots, s, s
 \end{aligned}$$

Inputs	Input prices per unit	Outputs
Deposits (p ₁)	Interest expenses ÷ deposits	Loan and Advances (O ₁)
Operating expenses (p ₂)	Operating expenses ÷ number of employees	Investments (O ₂)
Other Assets (p ₃)	Gross earning / Total assets × other assets / Total assets	Interest Income (O ₃)
		Non-interest income (O ₄)

4. Data and Model Specification

The data for the research were obtained from the published financial statements of Nigerian banks from 2002-2011. Information required for the analysis was extracted for all the banks randomly sampled operating in Nigeria during the period of 2002-2011. The banks include; first bank, Union bank, UBA, Zenith, GT bank, Diamond bank, Wema bank, Access bank, FCMB and Fidelity. All financial data are denominated in terms of Nigerian Naira(in thousands).Inputs used in the study are deposits (D), operating expenses (OE) and other assets (OA), while the outputs represent loans and advances (L), investment (I), interest income (IY) and non-interest income (NIY). Input prices were also chosen for the input variables as coded above for the inputs; p1, p2 and p3 respectively. Deposits is one are the overall resources available to banks for carrying out their activities like lending and investment. Operating expenses is the cost incurred in the banking financial intermediation, this include the cost of labour and all other labour-related expenses. And other asset is in form of liquid assets made available for intermediation. The outputs chosen for the study constitute one of the major activities of banks, i.e. to channel their funds into investments, advancing loans for profits and provide miscellaneous services to generate significant amount of interest and non-interest revenues.

5. Results and Discussion

Analysis of the efficiency scores are from table 1 and in 2002, Union bank, UBA, GTB, Diamond and FCMB showed a perfect allocative efficiency score of 1.000 meaning that they were optimally allocating both the human and financial resources to the production of different set of banking products in such a way that the productivity is maximized with regard to input price. First bank, Wema, Access, and Fidelity were in the range of 0.847 to 0.931 meaning that they were nearly efficient but there is a scope for improvement. Only Zenith bank was found low with a score of 0.667.

In 2003, UBA, GTB, Access and Fidelity showed a perfect allocative efficiency score of 1.000 meaning that they were optimally allocating both the human and financial resources to the production of different set of banking products in such a way that the productivity is maximized at low input price. First bank, Union bank, Diamond, Wema and were in the range of 0.773 to 0.954 meaning that they were nearly efficient but there is a scope for improvement. Zenith bank and FCMB were found low with a score of 0.632 and 0.672 respectively.

In 2004, GTB, Wema and Access showed a perfect allocative efficiency score of 1.000 meaning that they were optimally allocating both the human and financial resources to the production of different set of banking products in such a way that the productivity is maximized being aided by low price. First bank, Union bank, UBA, FCMB, and Fidelity were in the range of 0.740 to 0.971 meaning that they were nearly efficient but there is a scope for improvement. Zenith bank and Diamond were found low with a score of 0.668 and 0.667 respectively.

Table 1. Allocative Efficiency Scores of 2002 - 2011

S/N	BANK SELECTED	T.E. 2002	T.E.2003	T.E. 2004	T.E. 2005	T.E. 2006	T.E. 2007	T.E. 2008	T.E. 2009	T.E. 2010	T.E. 2011
1	First bank	0.889	0.884	0.746	0.746	0.853	0.877	0.688	1.000	0.978	0.891
2	Union bank	1.000	0.954	0.947	0.947	0.783	0.866	0.981	0.426	1.000	1.000
3	UBA	1.000	1.000	0.971	0.971	0.948	1.000	1.000	0.789	0.947	0.771
4	Zenith	0.677	0.632	0.668	0.668	0.791	0.810	0.804	0.808	0.808	0.713
5	GT Bank	1.000	1.000	1.000	1.000	1.000	1.000	0.954	1.000	1.000	1.000
6	Diamond	1.000	0.773	0.667	0.667	0.831	0.928	1.000	0.923	1.000	0.649
7	Wema	0.878	0.903	1.000	1.000	0.818	0.984	0.429	0.538	0.568	0.596
8	Access	0.847	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
9	FCMB	1.000	0.672	0.740	0.740	1.000	1.000	1.000	0.920	1.000	1.000
10	Fidelity	0.931	1.000	0.971	0.971	1.000	1.000	1.000	1.000	0.954	0.784
	Mean	0.931	0.882	0.871	0.871	0.902	0.946	0.886	0.840	0.926	0.840

Source: Researcher computation using DEAP Version 2.1

In 2005, Union bank, GTB, Wema, FCMB and Fidelity bank showed a perfect allocative efficiency score of 1.000 meaning that they were optimally allocating both the human and financial resources to the production of different set of banking outputs in such a way that the productivity is maximized by properly choosing the correct mix of inputs given the input prices. First bank, UBA, Zenith, Diamond, Access, and Fidelity were in the range of 0.733 to 0.992 meaning that they were nearly efficient but there is a scope for improvement.

In 2006, GTB, Access, FCMB and Fidelity showed a perfect allocative efficiency score of 1.000 by properly choosing the correct mix of inputs given the input prices, meaning that they were optimally allocating both the human and financial resources to the production of different set of banking outputs in such a way that the productivity is maximized. First bank, Union, UBA, Zenith, Diamond, and Wema were in the range of 0.783 to 0.948 meaning that they were nearly efficient but there is a scope for improvement.

In 2007, UBA, GTB, Access, FCMB and Fidelity showed a perfect allocative efficiency score of 1.000 because they have properly choosing the correct mix of inputs given the input prices meaning that they were optimally allocating both the human and financial resources to the production of different set of banking products in such a way that the productivity is maximized. First bank, Union, Zenith, Diamond and Wema were in the range of 0.810 to 0.984 meaning that they were nearly efficient but there is a scope for improvement.

In 2008, UBA, Diamond, Access, FCMB and Fidelity showed a perfect allocative efficiency score of 1.000 meaning that they were optimally and properly allocating both the human and financial resources to the production of different set of banking products in such a way that the productivity is maximized considering the given price. Union, Zenith, and GTB had a satisfactory level of score 0.845, 0.804 and 0.954 respectively meaning that they were nearly efficient but there is a scope for improvement. First bank and Wema were found with a low score of 0.688 and 0.429. Wema bank with 0.429 faced a turmoil situation as the score depicts inefficiency.

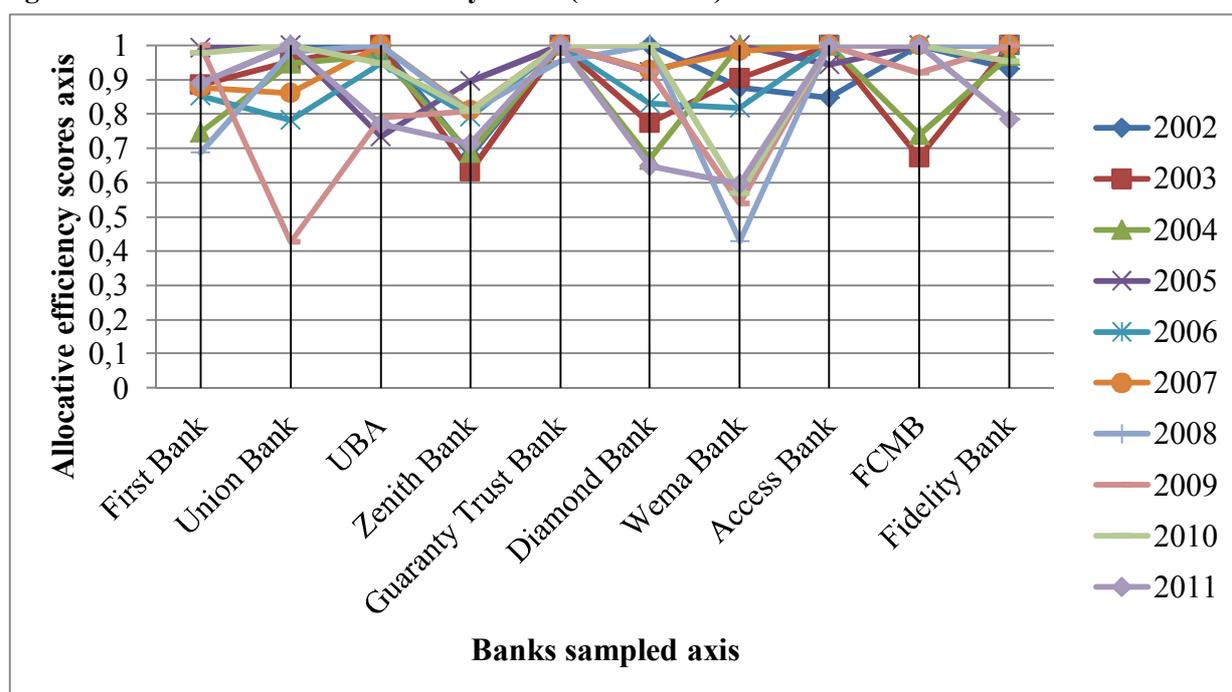
In 2009, First bank, GTB and Access bank showed a perfect allocative efficiency score of 1.000 due to the fact that they have properly choosing the correct mix of inputs given the input prices, meaning that they were optimally allocating both the human and financial resources to the production of different set of banking products in such a way that the productivity is maximized. UBA, Zenith bank, Diamond, and FCMB were in the range of 0.789 to 0.923 meaning that they were nearly efficient but there is a scope for improvement. Union bank and Wema bank were found low with a score of 0.426 and 0.538 meaning that the two banks did not allocate resources efficiently.

In 2010, Union bank, GTB, Diamond, Access and FCMB showed a perfect allocative efficiency score of 1.000 meaning that they were optimally allocating both the human and financial resources to the production of different set of banking output in such a way that the productivity is maximized by properly choosing the correct mix of inputs given the input prices. First bank, UBA, Zenith and Fidelity were in the range of 0.808 to 0.978 meaning that they were nearly efficient but there is a scope for improvement.

In 2011, Union bank, GTB, Access and FCMB showed a perfect allocative efficiency score of 1.000 meaning that they were optimally allocating both the human and financial resources to the production of different set of banking products in such a way that the productivity is maximized properly with regard to given price First bank UBA, Zenith, and Fidelity were in the range of 0.713 to 0.891 meaning that they were nearly efficient but there is a scope for improvement. Diamond bank and Wema bank were found with low efficiency scores of 0.649 and 0.596 respectively.

In addition, some Banks operated on the perfect allocative efficiency frontier by scoring 1.000 meaning that they have optimally allocated both financial resources and human resources to the production of different sets of banking outputs in such a way that the productivity is maximised. Likewise, the analysis of allocative efficiency revealed that banks, operating below the efficiency border, needs to reduce their costs by percent of the wasted cost in order to reach the efficiency frontier. The implication of this to objective two of the study, that is, evaluation of man-power-planning is that those banks on the allocative efficiency frontier had a perfect man-power planning (human resources) whereas other banks found below the frontier score did not effectively plan for man-power, who would have used the financial resources efficiently.

Figure 1. Trend of allocative efficiency curve (2002- 2011)



Source: Field Data (2013)

In 2002, the following banks had scores that were below efficiency frontier; first bank, zenith, wema, access and fidelity. They had cost waste ranging from 6.9% to 32.3%. In 2003, six banks also had allocative efficiency below the efficiency frontier, they were; first bank, union zenith, diamond, wema, and FCMB with cost waste ranging from 4.6% to 36.8%. In 2004, first bank, union, UBA, zenith, diamond, FCMB and fidelity had allocative efficiency score below the frontier with cost waste ranging from 2.9% to 33.3%. In the year 2005, the following banks had efficiency scores below the frontier; first bank, UBA, zenith, diamond and access with cost waste ranging from 0.8% to 26.7%. In the year 2006 as well, the following banks had cost waste as a result of their allocative inefficiency; first bank, union bank, UBA, zenith, diamond and wema ranging from 5.2% to 21.7%. In 2007, the banks that had cost waste in allocation of both financial resources and human resources were; first bank, union bank, zenith bank, diamond and wema with the range of 1.6% to 19%. In the year 2008, the following banks were also found recording cost waste; first bank, union zenith, GTB and wema with the range of 1.9% to 57.1%. In 2009, six banks from the sample were found below the allocative efficiency frontier with the cost waste ranging from 7.7% to 57.4%. In the year 2010 too, the following banks recorded cost waste ranging from 2.2% to 43.2% first bank, UBA, zenith, wema and

fidelity. Finally, in the year 2011 also, six banks had allocative efficiency scores lower than the best practice of 100%, the banks were; first bank, UBA, zenith, diamond, wema and fidelity. On average for ten years allocative efficiency for banks was 89.6%, indicating that the banks had not used efficiently to the maximum their inputs in the proportions that would minimize costs. Therefore, there is cost waste of 10.4%. Mohammad (2010) got the similar implication for banks in Pakistan where the banks found it difficult to use their inputs in a more optimal manner. In addition, figure 1 shows the graph of allocative efficiency, GT bank is almost found fully efficient among others and the bank following it is the access bank which is fairly efficient. It means other banks sell their banking products at higher prices than necessary. Again, most of the banks sampled dispersed away inconsistently from the frontier whereas GT bank and Access bank were fairly found on the efficiency frontier.

6. Conclusion and Policy Implications

This paper contributes to the existing literature by extending the analysis on allocative efficiency assessment of commercial banks across Nigeria through the Data Envelopment Analysis (DEA). This shows that efforts are needed by the banks in Nigeria to achieve higher levels of allocative efficiency. Obtaining high level of technical efficiency should be powered by superior investment strategies, managerial services, good input mix and provision of better-quality services to their customers at lower prices. Likewise, allocative efficiency analyses of Nigerian commercial banks have not been portraying global perspective. There exist banks like GT bank, Access bank, FCMB, Diamond, Fidelity, First bank and UBA which were to certain extent efficient and they have a consistency in their performance. However, GT bank showed a remarkable and consistent efficiency score among all other banks in the sample. Banks like Union and Wema can be a matter of concern as their efficiency scores were below satisfactory level sometime. This might be due to existence of competitive environment in the banking sector, rising levels of interest rates, higher non-interest and administrative expenses, to pursue less sophisticated investment strategies, and providing less competitive managerial services to their customers at the higher input prices.

The study leads to some useful managerial implications for Nigeria and other developing countries like Nigeria. First, to improve the allocative efficiency levels of banks across developing countries, it is imperative for the banks to utilize their labor and capital more efficiently, while simultaneously making an enhanced and proficient use of technology in their operations. Second, the banks across developing countries need to diversify their investments and enrich their services portfolio to minimize their risks and maximize returns. Third, there is a need to economize operating costs through internal restructuring, branch closures, and transacting business with their customers profitably beyond normal counter transactions of receiving cash and making payment. Fourth, local banks across developing countries need to adopt a global perspective. This could result into superior investment strategies, advanced managerial techniques, and provision of better quality and extended services to their customers. These major banks in the country deserve to be paid a better attention of the regulators and the administrators. Though, the banking sector of Nigeria portrays a picture of a developing economy, moving towards being a developed economy through continuous efficiency improvement. There is large room for improving efficiency score of most of the banks. Therefore, the only way to better meet the challenge of increased competitive pressure would be to increase technical and allocative efficiency which will determine an overall efficiency. To the larger extent, size and resources of the banks are good proxy for better management; therefore, banks ought to appoint professional bankers and managers in order to adopt the appropriate policies leading to a better use of their resources. Continuous development of human resources through training is also necessary in order to keep up with the productivity, improving cost-saving and rapid changes in techniques, financial instruments and technological development in banking. Finally, performance of the banking sector is a research avenue worth pursuing in this regard because of its nature as a driver of economy.

Basically on the above conclusion, the following policy recommendations are suggested:

1. To ensure sustainable performance in the banking Industry in Nigeria there is need for sound corporate governance.

2. It is important that sound macroeconomic, sectorial and structural policies are applied to improve internal balance, ensure external sector performance and stimulate the productivity base and industrial sector of the Nigerian economy.

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