The Developing Economies, XXVII-3 (September 1989)

THE EFFECT OF QUALITY OF MANAGEMENT ON THE PROFITABILITY OF COMMERCIAL BANKS: A COMPARATIVE ANALYSIS BASED ON NIGERIAN BANKING EXPERIENCE

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I. INTRODUCTION

THE underlying assumption of the concept of aggregate production function is that all firms will produce the same quantity of a product if they use the same quantity of factor inputs. This can only be true if all firms have the same degree of control over productive resources which in effect assumes that the efficiency of management is the same in all the firms to which the production function relates. However this is not likely to be so when the outcome of management decision is uncertain, as in banking where a great deal of risk exists in portfolio investments, the estimated coefficient of the production function or of the profit function derived from the production function will be biased unless variations in management efficiency are allowed for.

In Nigeria there is separation between management and operative functions in commercial banking. The management function involves planning, organizing, staffing, leading, and controlling of the resources of the organization towards the accomplishment of organizational objective. While weaknesses and difficulties may appear at any level of management, effective and perceptive management demands that all those responsible for the work of others, at all levels and in any enterprise, regard themselves as managers. The operative functions involve the actual implementation of management plans towards the achievement of organizational goals and objectives. This separation has become necessary partly because banking is becoming a highly complex activity and partly because the principles of management of Henry Fayol [10] and the scientific management of Taylor [48] with its emphasis on the separation of planning from doing among others, the influence of Elton Mayo [36], Chester Barnard [1], Abraham Maslow [34], Douglas McGregor [30], Henry Mintzberg [37] are beginning to have very strong influence in the management of banks. This is also evident in the greater emphasis being paid to improvements in the educational attainments of managers and experience on the job coupled with incentive motivating schemes for workers generally. Three important factors can be identified as responsible for the upsurge of interest in management. First is the deregulation in commercial banking in Nigeria as a result of the IMF imposed Structural Adjustment Programme (SAP) in 1986. The banking industry which formerly comprised forty-five banks in 1985 suddenly expanded to eighty-five between 1986 and 1989 (April) and there are indications

that the number is likely to increase further. This has generated great competition in an otherwise, uninnovative, passive, and uncompetitive industry. Banks now realize that in order to survive, provision of capital or technology does not suffice. The limiting factor is the lack of quality and vigor on the part of managers to achieve organizational objectives according to plan. There appears to be a new orientation towards strategic management and marketing, and quality of management.

Secondly, because of the earlier experience in the nation's banking history, the banking supervision department of the Central Bank of Nigeria now places great premium on the quality of management of each bank. Banks are required to maintain a crop of experienced and educated officers in the various functional activities of management, credit administration, marketing, finance (treasury), and personnel. The emphasis on quality of management which most banks have now come to regard as a challenge is based on the necessity to maintain a high level of banking practice and minimize the risk of bank failures which, because of the strategic position of banks to the national economy, could be injurious or detrimental to the national aspiration of rapid industrialization and economic development. Moreover, the nation has not forgotten the ugly experience in its banking history in which one manager was responsible for the collapse of two banks within six years.[1] The cause of the bank failures was largely attributed to managerial incompetence and inexperience [54] [49] [50] [39] [40] [41] [55] [45] [44].

Third is the emergence of wholesale banks as powerful competitors with the retail banks which have dominated Nigerian banking for a long time. Management in wholesale banking on the average consists of a crop of talented, highly educated, and fairly experienced officers most of whom are M.B.A. graduates. The content of the M.B.A. courses which include management theory, management by objective, organizational behavior, and strategic management, have exposed them to ways of achieving organizational objectives in a changing environment. For instance almost all the wholesale banks have computerized their banking operations at inception in anticipation of the wider volume of transactions made possible by computer innovations. Moreover they adopt aggressive marketing strategy as opposed to the conservative marketing posture of the retail banks. For instance within the credit and marketing department of wholesale banks the manager organizes the work force under him into teams based on different businesses around which the organization wants to build its growth and profitability. There are, for example, the construction and packaging team, the agric./agro allied, food and beverages team, the pharmaceutical/petrochemicals team, the textile team, the loan syndication/asset sales team, and the trade/export finance team. These teams function by constructing unique solutions to the complex financial problems of each customer. Targets are set for each team to achieve. The same aggressive approach to bank marketing is adopted by other departments of the bank. The results of the management processes have been significant improvement in profit and growth relative to bank size. The retail banks have been caught unawares by this approach to banking.

[1] The Industrial and Commercial Bank (failed in 1930 and the Nigerian Mercantile Bank failed in 1936) were managed by the same person as reported in [4].

They have found that they have to yield to the forces of change and adopt the best practice in the field.

However, not all banks are able to use the best practice or restructure their organization for improved performance because (a) the high level of performance to which a bank may aspire is predicated on the resources, human and material, it commands and its information processing ability; (b) the level of high performance sought depends on management process within the firm. Banks are becoming increasingly aware that the ability to plan, organize, coordinate, and translate concrete plans into realization depends to a large extent not only on the experience of managers but also on their educational level. This explains the widespread interest by banks in Nigeria in attracting talented and experienced managers within the profession and in pursuing vigorous staff development programmes to upgrade and diversify the skill of its staff, thereby increasing their competence and broadening their intellectual horizon.

The purpose of this study therefore is (a) to investigate whether variations in management efficiency among banks do, in fact, have significant effect on bank profitability, having first developed in appropriate measure of efficiency of management; (b) to explore other measures of efficiency of management and evaluate their impact on bank profitability; (c) to determine if there is any correlation among the various indices of efficiency of management as used in the empirical literature.

The results of this study have important policy implications. First if our index of management efficiency strongly influence bank profitability, then strong empirical support exists for the various staff development programmes embarked upon by banks in Nigeria to foster the emergence of future executives and/or to attract the relatively scarce talented, educated, and experienced managers within the profession. Secondly, should there be significant correlation among the various indices of management efficiency then the search for appropriate measures of management efficiency is not worth the bother as any one could serve the purpose. This has implications for the conduct of future research.

One point, however, should be noted. It may rightly be argued that the choice of profitability as the only objective of the firm is unrealistic with respect to modern banking organization where alternative objectives or multiple objectives such as growth, profitability, market share, corporate citizenship (social responsibility), capital adequacy, liquidity, and deposit mobilization are possible. However we submit that the other objectives are better achieved if banks maximize profit, as profit constitutes the basis of their corporate existence.

The rest of this paper is organized as follows. The next section concentrates on a review of the literature and the theoretical framework. In Section III the methodology of the study is presented. Section IV indicates the empirical results and their interpretations while Section V summarizes the findings and concludes the study.

II. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

According to neoclassical theory, management has two aspects: supervision and entrepreneurship. Supervision is rewarded by normal profits while entrepreneur-

ship, which involves decision-making under conditions of uncertainty, is rewarded by super normal profit as noted by Marshall [33]. The marginal productivity of entrepreneurship has no meaning in economics because the supply is independent of the output of the product under its control as observed by Makary and Rees [32]. Thus it cannot be treated as a factor in the production function. Griliches [14] and Doll [9] have opined that the management coefficient in the Cobb-Douglas function should be omitted from the sum of factor coefficients which denote the returns to scale since bankers (managers) might be able to double their output with double inputs of all other factors, but poor or ill-equipped bank managers require more inputs to achieve a given output. Then increasing returns to scale will prevail if managerial capacity is not fully utilized, and decreasing returns thereafter [15]. This reasoning therefore suggests that if management efficiency affects outputs, the inclusion of an appropriate measure of management efficiency should improve the fit of the production function or the profit function derived from the production function. So we have first fitted the function without the management variable and then with a management index to see if the fit is, in fact, improved by the inclusion, and if it is, then the quantitative impact of quality management is assessed.

III. METHODOLOGY

A. *Data: Sources, Nature, and Problems*

The analysis which follows is based on a sample of forty commercial banks comprising twenty-seven retail banks and thirteen wholesale banks which operated in Nigeria in 1986/87. The average of the two years figures are used. The sample includes the three largest retail banks, First Bank (FBN), Union Bank (UBN), and United Bank for Africa (UBA) and the four largest wholesale banks, International Merchant Bank (IMB), Continental Merchant Bank (CMB), NAL Merchant Bank (NAL), and ICON Merchant Bank (ICON). This means that our sample includes the main commercial banks which constitute over 60 per cent of the commercial banks' total sales in 1987. Bearing in mind that there were forty-nine banks operating in 1987, our sample size represents 82 per cent of the total. The data for each bank were obtained from the annual reports of the bank. Questionnaires and interviews were also used to obtain information on the educational qualification and experience of managers in each bank. Cross-sectional data are used. It is important, at this point, to note one particular problem with the data. Banks vary in their definition of "year." Thus while some have March as their reporting date, others report in June, September, or December. Hence there is an obvious built-in overlap in our data set which we attempt to minimize or adjust by applying the "rule of proximity." That is, the reporting date of March is considered as the December date of the previous year, while June and September dates are considered as December dates of the current year.

B. *The Models*

Three profit functions derived from three production functions were tested

against the observations. They were the linear, Cobb-Douglas, and constant elasticity of substitution (CES) profit functions.

A linear function would imply that returns to scale were always constant whereas neither of the other functions is so restrictive in this respect and hence might be considered to be preferable on these grounds alone. Nevertheless all three functions were fitted and the results compared.

The Cobb-Douglas profit function gave a markedly better fit than the CES profit function in terms of the sum of the squared residuals. The iterative method used to estimate the parameters of the CES function showed that the derived marginal products of the underlying variables do not differ significantly from those estimated with the Cobb-Douglas profit function.[2] The substitution parameter in the CES function was also very small implying that the elasticity of substitution was close to unity. Hence the Cobb-Douglas function was apparently appropriate. This agrees with the findings of Clark [6] and Mullineaux [38].

The linear function was fitted with and without the management variable. While the fit was good in both cases, the Cobb-Douglas profit function was distinctly better in respect of fit and the significance of the coefficients. In the interest of brevity therefore, only the results for the Cobb-Douglas profit function are reported.

Model 1

A single-equation model was used in which bank before tax profit to equity capital (Π) was regressed on wage rate w, deposit yield rate s, price of capital r, the number of bank branch offices B, and the composite credit yield rate P, based on the Cobb-Douglas restricted profit function, that is:

$$\ln\Pi = \ln A + \alpha^*_1 \ln w + \alpha^*_2 \ln r + \alpha^*_3 \ln s + \alpha^*_4 \ln P + \beta^* \ln B + \ln \varepsilon_1. \tag{1}$$

where α^*_1, α^*_2, $\alpha^*_3 < 0$, $\alpha^*_4 > 0$, $\beta^* > 0$ and where ε_1 is the random error term, A constant. Equation (1) is a special case of the normalized restricted profit function à la Lau and Yotopoulos because our composite price variable for bank credit (used as output in this study) is rather poor. The price variable P is defined by:[3]

$$P = \sqrt{Y_1^{S_1} \cdot Y_2^{S_2}}$$

where Y_1 = annual revenue from loans and advances,
Y_2 = annual revenue from investments (treasury bills, treasury certificate, etc.).
$S_1 = Q_1/(Q_1 + Q_2)$, and
$S_2 = Q_2/(Q_1 + Q_2)$,
where Q_1 = naira amount of loans and advances made within the year,
Q_2 = naira amount of investments made within the year,[4]

[2] See [29] [25] [26] [24] [8].

[3] This definition of P is attempt at finding a geometric mean for the output price variable based on the aggregate loan rate and investment rate. Hence the squared root sign.

[4] Q_1 and Q_2 constitute output for bank (that is, bank credit) in this study.

w = total annual wage bill including salaries and wages divided by the annual number of hours worked,
r = interest on fixed capital including depreciation, the cost of interest payment at 12.25 per cent per annum and annual cost of repairs and maintenance,
s = the total annual interest payments on deposits divided by the volume of deposit mobilized, and
B = the number of bank branch offices (see [38]).

From the above one can see that our price variable which is a geometrically weighted index of output prices is an attempt at recognizing the multi-product nature of bank output.[5] Equation (1) is derived from the Cobb-Douglas production function:

$$Q = HL^{\alpha_1} \cdot K^{\alpha_2} \cdot D^{\alpha_3} \cdot B^{\beta}, \tag{2}$$

where Q = naira amount of bank credit within the year,
H = constant,
L = number of man-hours worked per annum derived from the number of people employed,
K = naira value of capital investment in the year,
D = naira amount of bank deposit within the year, and
B = the number of bank branch offices, considered as fixed factor of production.

α_1, α_2, α_3, and β are the elasticities of the resource inputs.

The link between (1) and (2) is straightforward. Lau and Yotopoulos [25] [26], Lau [24], Yotopoulos and Lau [56] [57] have shown that given (2) where α_1, α_2, α_3, >0, $\beta > 0$, and $\alpha_1 + \alpha_2 + \alpha_3 \equiv \mu < 1$; and where L, K, D are the quantities of the variable inputs and B the quantity of the fixed input, $\alpha^*_1 = -\alpha_1(1-\mu)^{-1}$; $\alpha^*_2 = -\alpha_2(1-\mu)^{-1}$; $\alpha^*_3 = -\alpha_3(1-\mu)^{-1}$; $\beta^* = \beta(1-\mu)^{-1}$. Moreover β^* measures the returns to scale since for the Cobb-Douglas profit function (1) the necessary and sufficient condition for homogeneity of degree K of the underlying production function (2) is

$$\frac{K-1}{K}(\alpha^*_1 + \alpha^*_2 + \alpha^*_3) + \frac{B^*}{K} = 1$$

or

$$\beta^* = K - (K-1)\ (\alpha^*_1 + \alpha^*_2 + \alpha^*_3).$$

Thus if $K > 1$ (increasing returns) $\beta^* > 1$, $K = 1$ (constant returns) $\beta^* = 1$ and if $K < 1$ (decreasing returns), $\beta^* < 1$.

[5] For the controversy surrounding bank output measure, see [12] [2] [31] [43] [6]. We however use earning assets or bank credit because over 90 per cent of bank primary function is lending.

Model 2

In the analysis of bank production functions, management is not usually included as a separate variable because no completely satisfactory objective measure has been found. Nevertheless, some attempts have been made to quantity the contributions of management. A simple procedure is to utilize the residuals (deviations of observed values from fitted values) as a basis for an objective management rating [16] [3] [46] [52]. The justification for using the residual index is that all other factors are assumed to be paid the value of their marginal products, but this is not necessarily true. In any case the residual may not be totally ascribable to management but may be due partly to other excluded variables such as government regulatory policies [17] [51] [19]. A logical alternative measure of management efficiency is to relate profit/profitability in each observation to the average profit/profitability of the whole sample. This is consistent with the assumption of economic rationality as noted by Makary and Rees [32] but, unfortunately it is very difficult to obtain a completely homogeneous sample so that higher profits/profitability can reasonably be attributed to higher management quality alone. If the sample is not homogeneous it is always possible that some other included variables also contribute to profitability.

Some studies in agriculture have used an index of farming practices and technique in terms of deviations from recommended practices [20] [51] [53] [35] while Griliches [13] [14], Chaundhuri [5], and Herdt [18] used an index of education as a proxy for management quality. Although these studies were concerned with the agricultural sector they could be modified to take care of the banking situation. However this is not done in this study because apart from their subjective nature, such indices might measure management potentiality rather than actual management input [17].

Another approach that has been proposed in the literature by Timmer [51], Kelly [23], and Russell and Young [47] involves the estimation of a frontier production function and from it to compute an index of technical efficiency of each firm. Since the technical efficiency of a firm is basically a function of management, Kelly [22] used this index as a measure of management efficiency. The Timmer-based index of management efficiency is computed as follows, as performed by Russell and Young [47]:

Let $Y = f(X)e^{\mu}, \quad \mu < 0,$

so that the Cobb-Douglas production function takes the form

$$\ln Y = \sum_{j=0}^{n} \alpha_j \ln X_j + \mu, \quad X_0 = 1. \tag{3}$$

The random disturbances are assumed to follow a truncated normal, gamma, or exponential distribution and to be independent and identically distributed. Corrected ordinary least squares is used to estimate (3) and comprise two stages. In stage one, OLS (ordinary least squares) is applied to (3) yielding best linear un-

biased estimates of the j coefficients. In the second stage, the intercept estimate is then corrected by shifting the function until no residual is positive and one is zero. Green [11] has shown that a consistent, though biased, estimate of α_0, which imposes the sign uniformity on the residuals, will be generated by this procedure. The estimation takes the form

$$\ln REV = \alpha_0 + \alpha_1 \ln KAP + \alpha_2 \ln LAB + \alpha_3 \ln DEP + \alpha_4 \ln MAT + \varepsilon, \qquad (4)$$

where REV = Bank revenue (in million naira) deflated by 1987 composite consumer price index;

$KAP = D + X_0 + G + M + i$ where KAP is annual cost of capital (in million naira) deflated by 1987 consumer price index, D is the estimated annual depreciation, X_0 is the annual tax, G is the annual cost of building to house the equipment, M is the annual cost of repairs and maintenance, i is the cost of interest payments at 12.25 per cent per annum which is the price charged by the Nigerian government for credit;

LAB = Total wage bill (in million naira) deflated by 1987 composite consumer price index;

DEP = Total interest paid on deposits (in million naira) deflated by 1987 composite consumer price index;

MAT = Total administrative expenses (in million naira) deflated by the 1987 composite consumer price index; and

ε = Stochastic error term.

As the revised residuals ($\varepsilon_i < 0$) are defined as

$$\varepsilon_i = \ln REV_i - \ln REV_{\max}, \quad i = 1, 2, \ldots, 40.$$

where $REV_{\max}$ is the maximum revenue that could be generated if the bank were efficient,

$$\text{Timmer technical efficiency} = \exp(\varepsilon_i) = \frac{REV}{REV_{\max}} \leqslant 1. \qquad (5)$$

Only the efficient banks operate on the frontier.

Another management index constructed in the present study and also used for comparative analysis is derived from regressing bank credit (output) on education level Z_1 and years of experience Z_2. Linear, quadratic, and log-linear functions were tested and in all cases the linear model provided the best fit.

Z_1 is a dummy variable ranking the level of education as 1 for managers with WASC educational attainment, 2 for those with A.I.B. or B.Sc. (B.A.) degrees, 3 for those having both A.I.B. and B.Sc. (B.A.), and 4 for those with higher degrees (i.e., M.Sc. or Ph.D.). Experience is measured as the number of years a particular bank manager has spent in the banking industry (not necessarily in the same bank). Z_2 therefore is a dummy variable ranking the number of years of experience as 1 for one to four years of experience, 2 for four to six years, 3 for six to ten years, and 4 for ten years and above. We focus specifically on the assistant general

managers (AGM) or functional heads in charge of the four organizational functions in banking, credit administration (production), personnel, finance and control, and corporate development and planning (marketing). The incumbent managing director of a bank is also included.

This means that we consider five officers per bank. Their scores on Z_1 are summed and the average found for each bank. The same procedure is repeated on Z_2. The average scores for each bank, Z_1, Z_2 are then used in the cross-sectional regression of Q on Z_1 and Z_2. The index of quality of management is obtained by relating the educational level Z_1 and years of experience Z_2 for each bank weighted by the regression coefficients to the weighted average over the whole sample. That is

$$MI = (b_1Z_1 + b_2Z_2)/(b_1\bar{Z}_1 + b_2\bar{Z}_2), \tag{6}$$

where MI = index of quality of management,
b_1, b_2 = regressional coefficients for educational attainments and experience respectively, and
$\bar{Z}_1$, $\bar{Z}_2$ = the mean variables of Z_1 and Z_2 respectively.

The management efficiency index MI is then incorporated into the Cobb-Douglas profit function to yield

$$\ln\Pi = \ln A + \alpha^*_1\ln w + \alpha^*_2\ln r + \alpha^*_3\ln s + \alpha^*_4\ln p + \beta^*_1\ln B + \beta^*_2\ln MI + \ln\varepsilon_2. \tag{7}$$

Equation (7) indicates that both number of bank branch offices B and index of quality of management MI are fixed factors of production which cannot be varied in the short run. The significance and magnitude of the coefficient of the index of quality of management in the regression equation from (7) gives us a quantitative estimate of the impact of quality of management on bank profitability.

The index in equation (6), also used in equation (7), is an important measure of the quality of management and hence requires some further explanation. First it should be noted that equal weights have been given to both education and experience. The level of scholastic accomplishment is not given more weight than learning-on-the-job experience. This follows from the limitation of formal management education programs in both the universities and industries to develop explicitly the traits, skills and knowledge that are essential to career success and leadership in business organizations as seen in a hard-hitting paper by Livingston [28]. Second, how effectively a manager will perform on the job cannot be predicted solely by the string of degrees he holds, the grades he receives in school, or the formal management education programs he attends. Unless a manager acquires through his own experience the traits, knowledge, and skills that are vital to his effectiveness, he is not likely to advance far up the organizational ladder. Third, problem-solving (as opposed to problem finding) and decision-making in the classroom require what psychologists called respondent behavior. It is the type that enables one to get high grades in school exams, even though one may never use in later life what one has learned in school. On the other hand success and fulfillment in management work demand what psychologists call operant behavior

—doing what needs to be done, finding problems and opportunities, initiating action, and following through to achieve results.

In summary, for the practical implementation of this study the comparative analysis involves

(a) the use of residuals of the Cobb-Douglas production (2).

That is given that

$$Q=KL^{\alpha_1}K^{\alpha_2}D^{\alpha_3}B^{\beta}e^{V}, \tag{8}$$

where v is the stochastic error term where all other variables are as defined previously, the residual is given by

$$RESID = Q - \hat{Q}, \tag{9}$$

where $\hat{Q}$ is the estimated bank credit using (4) and after taking logarithms and applying ordinary least squares (OLS).

(b) the use of profitability/average profitability of the sample. If it is given that *PROF* is the profitability of bank i and *PROFTA* is the industry average before tax return on capital then the management efficiency rating of bank i is given by

$$PROFG_i = PROF_i - PROFTA. \tag{10}$$

(c) the use of Timmer-based Technical efficiency rating ($EX1$) as an index of quality of management. That is

$$EX1 = \frac{REV}{REV_{\max}}, \tag{11}$$

where REV is revenue and $REV_{\max}$ is maximum revenue possible if the bank were technically efficient.

(d) the use of the index of efficiency of management given by

$$MI = \frac{b_1Z_1 + b_2Z_2}{b_1\bar{Z}_1 + b_2\bar{Z}_2}. \tag{12}$$

IV. EMPIRICAL RESULTS AND INTERPRETATIONS

The empirical results are presented in three tables; Table I, Table II, and Table III. In Table I we present the results of the management efficiency ratings based on *RESID, PROFG,* $EX1$ and *MI* of equations (9), (10), (11), and (12). In Table II the correlation matrix of efficiency of management ratings is presented. Equation (13) gives the estimates of equation (8) from which the residual, *RESID,* is obtained and used as the index of management efficiency rating [16] [3] [46] [52]. Equation (14) gives the estimates of equation (4) from which the corrected ordinary least squares (COLS) is applied to compute $EX1$. Equation (15) gives the estimate of the normalized restricted profit function (1) without the index of management efficiency variable while equations (16), (17), (18), and (19) give the estimates of the parameters with the various indices of management efficiency included to see

TABLE I

MANAGEMENT EFFICIENCY RATINGS OF COMMERCIAL BANKS

S/N	Banks	*RESID*	Rank	*PROFG*	Rank	*EX*1	Rank	*MI*	Rank
1.	ACB	−0.0193	27th	−0.4128	37th	0.4048	33d	0.9900	15th
2.	Allied	0.0810	23d	0.0312	19th	0.6064	32d	1.1900	5th
3.	BCCI	0.5465	6th	0.1643	11th	0.6456	17th	1.1910	4th
4.	BON	0.3198	13th	0.0907	14th	0.6411	18th	1.0910	9th
5.	Co-opt	0.7742	3d	−0.3559	34th	0.4032	34th	0.9500	17th
6.	CCB	0.1673	18th	0.0157	20th	0.6488	16th	1.0000	13th
7.	Cre-ly	0.1576	19th	0.0693	16th	0.7914	7th	1.0100	12th
8.	FBN	0.0853	22d	0.0786	15th	0.6671	13th	1.3000	1st
9.	HBN	0.1761	17th	0.1741	9th	0.3876	35th	0.9000	16th
10.	IBWA	−0.1761	30th	−0.2880	32d	0.5444	20th	1.3000	1st
11.	KNCB	0.5453	7th	−0.4307	38th	0.2571	39th	0.7000	22d
12.	KDCB	0.5088	11th	−0.1885	26th	0.3822	36th	0.8100	21st
13.	LOBI	−0.4263	36th	−0.0366	21st	0.4368	30th	0.4200	19th
14.	MBN	0.2501	15th	−0.3339	33d	0.3820	37th	0.9300	18th
15.	NAB	−0.3502	35th	−0.0834	22d	0.4749	23d	0.9800	16th
16.	NBN	0.0610	24th	−0.4303	40th	0.4206	31st	1.0000	13th
17.	NNB	−0.1975	31st	−0.2108	28th	0.3198	28th	0.9990	14th
18.	NIB	0.5121	10th	1.6435	1st	1.0000	1st	1.2500	2d
19.	PAB	0.2080	16th	−0.4048	39th	0.1917	40th	0.8500	20th
20.	PROG	−0.2054	32d	−0.1831	25th	0.8344	5th	1.0000	13th
21.	OBN	−0.1506	29th	0.0583	17th	0.4656	24th	1.0000	13th
22.	SBN	0.1452	20th	−0.1508	24th	0.5644	19th	1.2500	2d
23.	SGB	−1.9103	40th	−0.2639	30th	0.4575	25th	1.2000	3d
24.	SCB	0.1033	21st	−0.2815	31st	0.4452	29th	0.7000	22d
25.	UBN	0.0100	26th	−0.2432	29th	0.5724	12th	1.3000	1st
26.	UBA	0.0317	25th	−0.2032	27th	0.6559	15th	1.3000	1st
27.	NBN	−0.2551	33d	−0.4124	36th	0.4494	28th	0.9600	16th
28.	IMB	0.2806	14th	0.2602	3d	0.8413	4th	1.2500	2d
29.	NAL	0.5313	8th	0.2215	6th	0.8235	6th	1.2500	2d
30.	ICON	0.5544	5th	0.2549	4th	0.8828	2d	1.2500	2d
31.	CMB	−0.0741	28th	0.2513	5th	0.8681	3d	1.2500	2d
32.	FIMB	0.8555	2d	0.0451	18th	0.6621	14th	1.1000	8th
33.	FEMB	−0.4521	37th	0.4351	2d	0.7680	8th	1.1000	8th
34.	NMB	0.4775	12th	0.2375	7th	0.6880	11th	1.1500	6th
35.	NAMB	0.5198	9th	0.2315	8th	0.7277	9th	1.1200	7th
36.	NIGBEL	0.5560	4th	0.0998	13th	0.7137	10th	1.1000	8th
37.	MBA	1.1225	1st	0.1314	12th	0.5169	21st	1.0900	10th
38.	INDO-NIG	−0.3128	34th	0.0407	15th	0.4628	25th	1.0900	10th
39.	GRINDLAYS	−1.3426	39th	−0.1468	23d	0.4894	22d	1.0200	11th
40.	MBC	−0.6532	38th	0.6656	10th	0.4517	27th	1.1000	8th

if the fit of the profit function is indeed improved. In each case the t values are enclosed in brackets directly below the parameter estimates to which they correspond.

TABLE II

CORRELATION MATRIX OF INDICES OF MANAGEMENT EFFICIENCY

	RESID	*PROFG*	*EX*1	*MI*
RESID	1.0000			
PROFG	0.1254	1.0000		
*EX*1	0.0197	0.4087	1.0000	
MI	−0.0194	0.1659	0.2813	1.0000

TABLE III

CORRELATION MATRIX OF THE PROFIT FUNCTION VARIABLES

	Π	*w*	*s*	*r*	*P*	*B*
Π	1.0000					
w	−0.8278	1.0000				
s	−0.9398	0.7772	1.0000			
r	−0.7248	0.6318	0.6703	1.0000		
P	0.8609	−0.1143	−0.2022	−0.3202	1.0000	
B	0.5756	−0.9216	−0.8300	−0.6928	0.2617	1.0000

$$\ln Q = -1.5287 + \underset{(-0.4522)}{0.3060}\ln L + \underset{(2.6956)}{0.21033}\ln K + \underset{(1.6465)}{0.5853}\ln D + \underset{(0.2907)}{0.7304}\ln B, \quad (13)$$

$$\bar{R}^2 = 0.71105;\ F(4, 35) = 24.993,\ SER = 0.8256,$$

$$\ln REV = 1.0967 + \underset{(4.6789)}{0.1013}\ln KAP + \underset{(1.7654)}{0.1522}\ln LAB + \underset{(7.5063)}{0.5915}\ln DEP + \underset{(0.3192)}{0.0437}\ln MAT, \quad (14)$$

$$\bar{R}^2 = 0.9067,\ F(4, 35) = 95.778,\ SER = 0.3612,$$

$$\ln \Pi = -9.5691 - \underset{(-1.9292)}{0.9075}\ln w - \underset{(-2.3074)}{0.3929}\ln s - \underset{(-0.9137)}{0.7563}\ln r + \underset{(3.7634)}{1.2156}\ln P + \underset{(3.8789)}{1.1058}\ln B, \quad (15)$$

$$\bar{R}^2 = 0.5004,\ F(5, 34) = 10.755,\ SER = 1.2817,$$

$$\ln \Pi = -8.7610 - \underset{(-1.6637)}{0.9052}\ln w - \underset{(-2.0289)}{0.0819}\ln s - \underset{(-0.1448)}{0.7964}\ln r + \underset{(2.6981)}{1.1273}\ln P + \underset{(2.1991)}{1.0584}\ln B - \underset{(-0.8911)}{0.5948}RESID, \quad (16)$$

$$\bar{R}^2 = 0.4398,\ F(6, 33) = 7.1246,\ SER = 1.3400,$$

$$\ln \Pi = 7.1747 - \underset{(-1.5724)}{0.7611}\ln w - \underset{(-2.0824)}{0.01729}\ln s - \underset{(-0.04102)}{0.4185}\ln r, + \underset{(2.758)}{1.134}\ln P + \underset{(4.086)}{1.0754}\ln B + \underset{(2.7620)}{1.6968}PROFG, \quad (17)$$

$$\begin{aligned}
&\bar{R}^2 = 0.5318,\ F(6,33) = 9.8598,\ SER = 1.2251,\\
\ln\Pi\ &= -3.8668 - 0.4033\ln w - 0.4988\ln s - 0.4832\ln S\\
&\quad (-0.8104)(-1.0894)\quad (-1.0006)\quad (-1.5356)\\
&\quad + 1.1501\ln P + 1.095\ln B + 3.6097EX1, \qquad (18)\\
&\quad (3.4672)\quad (2.7724)\quad (2.6455)\\
&\bar{R}^2 = 0.5246,\ F(6,33) = 9.6077,\ SER = 1.2344,
\end{aligned}$$

$$\begin{aligned}
\ln\Pi\ &= -4.7781 - 0.29039\ln w - 0.2958\ln s - 0.4572\ln r\\
&\quad (-1.36307)(-1.0089)\quad (-2.9025)\quad (-3.9150)\\
&\quad + 1.122\ln P + 1.1680\ln B + 4.4001M1, \qquad (19)\\
&\quad (3.658)\quad (4.5793)\quad (6.1227)\\
&\bar{R}^2 = 0.7274,\ F(6,33) = 19.556,\ SER = 0.9740.
\end{aligned}$$

Table III presents the correlation matrix of the variables in the normalized restricted profit function to provide an indication of the influence of omission of important variables. Very interesting results are evident.

First we note that, using the residual as an index of management efficiency, MBA tops the group followed by FIMB while SGB brings up the rear. MBA and FCMB are wholesale banks while SGB is a retail bank. On the PROFG rating NIB tops the group followed by FCMB while NBN brings up the rear. NIB and NBN are retail banks while FCMB is a wholesale bank. However, we wish to stress that NIB has operated more as a wholesale bank than as a retail bank right from its inception in 1984. On the technical efficiency ratings used as a proxy for quality of management, since management has the responsibility of improving the productivity of factors of production, we again find that NIB tops the group followed by ICON, another wholesale bank, while PAB, a retail bank, brings up the rear. An analysis of the $EX1$ ratings indicate that only 20 per cent of the sample banks are 75 per cent efficient or better while only twenty-one banks are 50 per cent efficient or better. What this means is that the same level of revenue could still have been generated by using 50 per cent less of the resources if the banks were technically efficient. On our index of management efficiency based on the educational attainment and experience of the executives of banks, our results are as expected. The oldest and former expatriate banks FBN, IBWA, UBN, and UBA top the group (these are all retail banks) followed closely by NIB, IMB, NAL, ICON, and CMB (all wholesale banks). PAB, a retail bank, brings up the rear. Notice that PAB occupies the rear position on two indices of management efficiency, $EX1$ and MI.

Equation (15) indicates the estimate of the profit function without the management variable. The result indicates that the wage variable and price of capital variable are statistically significant at the 5 per cent level, while the credit yield rate variable and number of bank branch offices are significant at better than the 0.1 per cent level. The constant term and the deposit rate variable are not statistically significant although the deposit rate conforms to the expected sign (i.e., negative). The adjusted coefficient of multiple determination i.e., $\bar{R}^2$ is average, about 50 per cent. The correlation matrix depicted in Table III shows a high intercorrelation between wage rate, deposit yield rate, price of capital, and number

of bank branch offices. This collinearity could lead to inaccuracy of the estimates as could the omission of important variables between banks in the degree of control over their factor inputs. Management might be expected to be an important factor and variations in management efficiency between banks could be considerable. Hence our management efficiency indices are incorporated into the profit function to estimate the effects.

The results as shown in equations (16), (17), (18), and (19), by comparison with that of equation (15) indicate that the fit is not improved (rather it decreases) for the case of *RESID* but is improved for the case of *PROFG, EX*1 and *MI* as seen in the magnitude of $\bar{R}^2$ which decreased from 0.5004 to 0.4398 in the case of *RESID,* but increased to 0.5318 in the case of *PROFG,* 0.5246 in the case of *EX*1, and 0.7274 in the case of *MI.* In all cases, our index of management efficiency (quality of management) based on *MI* provides the best fit in terms of highest $\bar{R}^2$, lowest value of the standard errors of the regression (*SER*), and in terms of the magnitude of its impact on bank profitability. The magnitude of the effect of quality of management based on the various indices ranges from −0.5948 on the low side to 4.4 on the high side. The negative value of the coefficient of *RESID* (management) is unrealistic. Its value however is supportive of the criticism by Heady and Dillon [17], Timmer [51], Hunter and Timmer [19] that the residual may not be totally ascribable to management but may be due partly to other excluded variables such as government regulatory policies and partly to the possibility that all other factors are not paid the value of their marginal products. Moreover the fact that the coefficient is not statistically significant even at the 10 per cent level means that much confidence cannot be placed on the result.

However the results based on *PROFG, EX*1 and *MI* are more meaningful not only in terms of the improvement in the fit of the profit function but also in terms of its positive and statistically significant effect on bank profitability. For example, the results of equation (19) show that an increase in the management efficiency rating by one unit will more than quadruple bank profit while that for equation (18) indicates that improvement in bank level of technical efficiency will give rise to a more than trebling of bank profit. The two sets of results indicate that experience and educational attainment are definitely important for superior bank performance as well as the general level of enlightenment of management coupled with management determination to reorganize the resources for improved performance.

The results based on the different indices of quality of management are different not only in terms of the impact of the index of management efficiency on bank profitability but also in terms of the way in which the introduction of an index affects the estimated coefficients in the profit function. The reason for the differences can be gathered from the correlation matrix of the indices of management efficiency in Table II. An examination of the table indicates that the four indices are not correlated with one another and hence their differential impacts on bank profitability and on the coefficients of the estimated profits function are to be expected.

From the results of this study it is evident that the structure of commercial banking in Nigeria is characterized by increasing returns to scale as seen from the

sum of the coefficients of B and the management efficiency index in equation (17), (18), and (19) which far exceeds unity. This implies that managerial capacity of Nigerian commercial banks is far from being fully exploited and is thus one of the critical factors responsible for differential bank profit performance. For banks that perform poorly on the management efficiency ratings, particularly on *MI,* there is the urgent need for the banks to restructure their management terms to make for more educationally qualified, englightened, and experienced bankers with business orientation to manage the affairs of the banks. It is thus not surprising therefore why this category of banks performed poorly on the profitability measure as seen in [42]. There is also need for banks to set higher targets (or aspiration levels) and motivate their managers for higher performance, particularly so for banks low on $EX1$ rating. An important result of this study is the provision of a quantitative estimate of the extent of the effect of quality of management on the profitability of commercial banks, thereby supplying an empirically validated justification for the various manpower development programmes in banking and the search for the relatively scarce already trained, experienced, and educationally qualified personnel within the banking profession.

In the various staff development programmes to nurture the emergence of future bank executives, greater emphasis should be placed on improving not only the planning ability but also the coordinating ability of managers. This ties very much with Kaldor's suggestion [21] that the managerial function could be subdivided into "uncertainty bearing," "supervision," and "coordination." Uncertainty bearing can be minimized by effective planning. "Supervision" can also be improved by delegating more responsibility to managers who should be able to benefit from experience. The coordinating factor is very critical to managerial success. Kaldor defines the "coordinating" factor as that which is concerned first with resource allocation along investment lines, and second with the adjustment of the production techniques to the changes in the economic and environmental conditions. Consequently you cannot increase the supply of coordinating ability available to an enterprise alongside an increase in the supply of other factors as it is the essence of coordination that every single decision should be made on comparison with other decisions, as has been observed by Dawson and Lingard [7]. It is expected that if the current interest in quality of management in Nigerian banking is sustained then the nation will be better off in the long run since banking constitutes a critical component in the national development effort.

V. CONCLUSION

The neoclassical production function has represented output as a function of a relatively small number of inputs. Although a priori reasoning would suggest that management is an important input in production, this factor is commonly missing from production function specifications because researchers find it too difficult to define and quantify a suitable management variable. In response to the Leibenstein argument [27] that managers determine not only their own productivity but the productivity of all other inputs and therefore that a fixed input called "management" ought to be included in the production function, this study attempted to

construct various indices of management efficiency and used them to evaluate the relative impact in bank profitability. We have assumed that the management input enters the production functoin in a multiplicative manner. Of all the indices constructed, the index of management efficiency based on the experience and educational attainment of managers provides not only the best fit but also generates the largest impact on bank profitability. Specifically the finding suggests that bank managers with long years of experience in addition to good education are most productive and contribute most to profitability. This finding is consistent with the results from countries with developed banking structures and highly qualified and experienced bank managers. The study has not indicated that bank managers with a high level of education per se are very productive. Test of this hypothesis was not possible. Rather the study indicates that a combination of high level of education and experience on the job makes for supreme performance on the part of managers. Of course we have assumed that the motivational factor is strong and present. The high elasticity of management input means that management efficiency has greater scope for improvement and utilization and that it pays for banks to encourage staff development programmes and to provide opportunities for managers to gain more experience on the job. Through such programmes of human capital development the competence of the staff will be increased and their horizon broadened. This way, they will be better equipped to cope with the heightened competition in the banking industry and ensure that the bank continues to post profits in this era of deregulation and the attendant influx of other entrepreneurs into banking.

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