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The Efficiency of Cost Characteristics in Selected Insurance Firms in Nigeria

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Abstract: The aim of this study, is to examine performance efficiency of the insurance industry, the outcome of which may generally assist insurance managers, investors and especially the insurance regulators on how to evolve appropriate measures that would revamp insurance business in Nigeria. The specific objective of the study is to examine cost efficiency characteristics across various sizes of insurance companies' vis-à-vis large, medium and small firms. The major data used in this study was obtained from the secondary source. The insurance financial data was obtained from Annual Reports and Accounts of each of the twelve sampled Nigeria insurance companies. The use of major model of functional form and profit function model were employed in this study and the multiple regression results was validated on the basis of F derived from Analysis of Variance (ANOVA) table. It was discovered from findings that there is an inverse relationship between labour input price and the firms' profit. An urgent need for recapitalization process in the Nigerian insurance industry was thus recommended because it would be better to have fewer number of strong capital based firms than many whose cost of production are sub-optimal.

Key words: Efficiency, services, cost of production, insurance firms

INTRODUCTION

The significance of Insurance Companies in any economy is greater than what their number and size might want to suggest. This is due to a number of reasons. First, is the role of Insurance Company as financial intermediary, for financial intermediation role, insurance pool together income generated from premiums paid through various categories of insurance policies. Insurance company is a production firm, attracting a different class of policies from the economy, pool these premium realized together to help bear risk whenever the holder of an insurance policy suffers genuine loss. This role of insurance company as risk taker, saving mobilize and financial intermediary of shorts affects not only the pace but also the pattern of economic activity particularly in developing countries. The way and manner in which financial system function determines to a large extent the capital shortage problems often experienced in the less developed countries (Soyode, 1983). Apart from Banks, insurance companies play a very crucial role in the take-off of economic growth of a nation. The entrepreneurship in the business activity can be enhanced better when insurance companies help bear losses that are often more sever in the developing economy, where both internal and external business environments are such hostile ones that stifle rather than encourage business enterprises. Few of such risky business environmental factors includes: Lack of capital arising from low level income, inconsistent economic and political policies, a long reign of military rule, institutional rigidities and lack of access to foreign markets among others.

Consequent upon restructuring, especially deregulation of interest rates in the finance sectors of the Nigeria economy, most financial institutions have had to operate in an increasingly competitive environment. This trend might subsist for long as government policy is geared towards competitive market based on privatization, commercialization and deregulation. The need to meet up with capitalization requirement of the Central Banks had engendered consolidation process, which in turn, has brought about mergers, acquisition and raising of more capital in the stock market. Apart from banks, another sector which has been penciled down for similar policy direction in Nigeria is insurance industry.

Insurance companies, like banks do also operate in competitive environment. With heightened competition, whether and how insurance companies may survive in the emerging environment depend in part on how cost efficiency, economies of scale and scope, impact on their operations. Cost efficiency estimates how production costs of an individual company differs from the production costs of a best-practiced company under the same condition and producing same outputs. Efficiency

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of production is measured with regards to cost function that is normally constructed from the observation of all companies considered within the sample set. Cost functions are derived from the production function which describes the best available efficient methods of production at any point in time. Economic theory classifies cost into short run and long run. While some factor inputs are fixed in the short run, the long run costs accommodate change of all factors of production. Total cost is a multivariable function as it is determined by many factors. Such factors might include the quantities and qualities of factor inputs, the efficiency of the entrepreneur as regards the optimum choice and combination of both technical and economic input to produce the maximum output (Kwan, 2001).

A number of studies have been carried out on the concept of efficiency, but dominant part of the study were actually tailored towards banking industry (Asthon, 1998; Kwan, 2001). Few or none has been recorded on insurance industry, even though both banks and insurance companies are important players in the financial market.

Our conviction is that given certain conditions, there exists an optimal production scale that must be met by insurance companies. Ability to recognize this optimum scales, scope and the most efficient cost frontier will assist both insurance regulators and insurance companies in shedding light on what constitute optimal production process and market structure in insurance industry. Furthermore, by regulation, insurance companies are forced to invest about 60% of their premiums on government securities.

Many works in the literature have suggested various avenues through which a business organization could experience cost efficiencies, among such avenues include organizational structure, executive compensation, market concentration, mergers and acquisition, common stock performance and risk-taking (Kwan, 2001). Both bank and Insurance companies perform financial intermediation role in the finance market. While bank emphasizes regular liquidity, insurance on the other hand could mobilize funds through premium payments of their clients and invest such funds into a long term investment depending on when the insured policy with their client matures; life insurance policy could take forty years, for instance. Whereas bank depositors are entitled to collect back their funds from the bank on demand. This phenomenon emphasizes the liquidity nature of commercial banks.

The aim of this study, is thus to examine performance efficiency of the insurance industry, the outcome of which may generally assist insurance managers, investors and especially the insurance regulators on how to evolve appropriate measures that would revamp insurance business in Nigeria.

The specific objective of the study is to examine cost efficiency characteristics across various sizes of insurance companies' vis-à-vis large, medium and small firms.

MATERIALS AND METHODS

Sample size and data collection procedures: The following listed insurance companies therefore form our samples:

- Vigilant insurance limited.
- Niger insurance plc.
- ACEN insurance plc.
- Yankari insurance company limited.
- WAPIC insurance plc.
- Mutual benefit assurance plc.
- AIICO insurance plc.
- Royal exchange assurance plc.
- Continental insurance plc.
- UNIC insurance plc.
- International energy insurance company.
- NFI insurance plc.

The major data that was used for this study was obtained from the secondary source. The insurance financial data was obtained from Annual Reports and Accounts of each of the sampled Nigeria insurance companies. The Annual Reports and Accounts of each of the insurance company comprises sufficient data that measure all the variables of the cost, economies of scale and economies of scope that were necessary for this study. The Central Bank of Nigeria statistical bulletin as well as report of National Insurance Commission also served as complimentary information about the insurance activities in Nigeria.

Three categories of insurance companies were sampled for this study. The first category were the smaller size whose total assets would not be less than ₦100 million but not above ₦150M. Insurance company that has between ₦100 million to ₦150 million worth of assets was categorized as small scale, the insurance company that has between ₦151M to ₦500 Million was categorized as medium scale and the large scale insurance company was based on N501 Million and above assets based. This categorization has a strong replica in the work of Afolabi and Osota (2001) on the production characteristics in the banking industry. As at the time of this study a total number of 123 functional insurance companies existed in Nigeria.

Cost efficiency model: It is only plausible to state that the insurance company's ability to attain higher profit performance would be dependent upon net returns (earnings) realizable from its productive resources (Nyong, 1989). The neo classical production analysis using Cobb-Douglas approach traditionally uses factors of production as proxies for explanatory variables. This approach though very popular in the literature has been subjected to a major criticism that the parameter estimates derived from direct estimation using ordinary least square are not always known to be consistent.

However, such scholars as Mullineaux (1978) and Levine (2001) for agricultural production and Nyong (1989) for commercial banks, under the assumption that factor inputs are exogenous have estimated profit function as dependent variable. The exogenous variables in those works includes prices of capital, labour, deposit earning assets and the number of branch offices to proxy fixed factor input. On the basis of the above explanation therefore the variables included in the estimation of profit function in this work are defined.

Profitability variable: This is a dependent variable which measures profit before tax in relation to equity capital. This compares efficiency among various firms.

LP-Labour-Input price: This can be derived by dividing annual wages and salaries of insurance company by the number of staff. Economic theory suggests an inverse relationship between factor inputs prices and the profit of a business. On this account, increase in salaries and wages reduces the level of profit.

$$\frac{\partial \prod}{\partial Lp} < 0$$

Kp the price of capital: This can be obtained by dividing annual maintenance cost of premise depreciation other equipment, machines and furniture by book value less depreciation of premise and furniture.

$$\frac{\partial \prod}{\partial Kp} < 0$$

Ep-Entrepreneurial price: This is measured d by the amount of commission and other expenses paid on insurance policy marketing.

$$\frac{\partial \prod}{\partial Ep} < 0$$

On a priori basis, it is expected that increase in the commission and other expenses paid on clams, reduces the level of profit.

SC, MC, LC are included in the equation to represent dummy variables for small company medium company and large company, respectively. Such that the impact of the group of the size to which an insurance company fall can be captured. In addition the introduction of these dummy variables would afford us an opportunity to appraise relative economic efficiency across the three size categories.

The functional form of the profit function is hereby expressed:

$LnΠ = LnA^{+}+\propto_1+LnLp +\propto_2^{+} Lnkp +\propto_3^{+}LnEP+B^{+} LnBo +Y1MC +Y2LC+Ln\sum A_1+\propto_1^{+}, \propto_3^{+}, B^{+}, Y_1, Y_2,$ = constants.

$Ln\sum$ = μ error term. This error term is assumed with the usual classical properties.

E(U) = 0.i.e. (Ui, Uj) = 0, I = j Errors are randomly distributed with mean zero.

E(Ui Uj) = 0 1 # j = error terms are not correlated.

$U\sim N(0, \sigma^2)$, = This is a normality assumption with constant variance.

Cov (X, U) = 0 the disturbance terms are not correlated with the explanatory variable x.

U represents the problem of omitted variables and error that may arise as a result of wrong measurement, for all values of x the U's will show the same dispersion around their mean restricted profit function which is derived through appropriate transformation as factor input prices are not present. Normalized restricted profit represented by:

$$\prod n = \frac{n}{p.}$$

Variable factor input prices can therefore be expressed using a real term transformation as below:

$$LnΠn = LΠ\ n\text{-}LΠP$$

$$LnA^{+}+\propto_1+LΠ\ \frac{Kp}{P}+\propto_2+Ln\ \frac{Kp}{P}+\propto_3 Ln\frac{P_D}{p^{+}}\propto^{+}_4 LnP +\beta*LnZ$$

$$= LnA^{*} +\propto_1 LnP_k+\propto_2 *LnPk+ \propto_3 *LnP_D$$

The above equation is the earlier stated equation without dummies

Performance scale and market share:

$$L\Pi n = LnA^{+}+\theta_1 LnK_p+\theta_2 LnL_p+\theta_3 LnP_0+\theta_4 LnMkt.S+ \beta^{+}LnZ +Y_{11}MC + Y_{12}LC + Ln\sum.$$

$A^{+}_1\ \theta^{+}_2\ \theta^{+}_3\ \beta^{+}_1\ Y_{11}\ Y_{12}$ are all constants and $\sum 1$ error term. It is expected that there is a positive relationship between Market Share variable and profit. When the market share of an insurance company is higher, profit is also higher.

Scope, scale and performance:

$$Ln\Pi = LnA^{*}+\propto^{*}_1+LnLp+\propto^{*}_2 LnKp+\propto^{*}_3 LnPm+\propto_4+ LnCL+Y_1MC+Y_2LC+Ln\sum.$$

Other variables have been defined in the previous estimation, except Pm and CL which are described as follows:-

PM = Premium is however a pooled income of the insurer which in most times invested to generate more income for the firm.

This study shall add up investment income with premium income. Higher premium as a result of higher scope of line of business put insurance firm in a better position to undertake more business and make more profits from higher investment portfolios.

A prior expectation therefore suggests a positive relationship between volume of premium and total profit of an insurance firm, *"ceteris paribus"*.

CL = Claims is the compensation paid to the policy holder as a result of loss he has suffered. The higher the volume of clams, due to policy holders, the lower the volume of profit of an insurance firm, in this case, there is a negative relationship between volume of claims and the level of profit of an insurance firm.

The experience in Nigerian insurance industry is that some insurers have become defaulters of claims payment to their policy holders; hence the insurance business patronage has not been too encouragement.

Validity test: In this research, we have employed the used of a major model of functional form, and profit function model.

Our multiple regression results shall be validated on the basis of the following criteria:-

The test for the power of the overall explanatory variables to explain the earlier stated causal relationship shall be by R^2, (which is coefficient of determinations).

F* ratio shall be derived from Analysis of Variance (ANOVA) table, by making use of Statistical Package for Social Sciences (SPSS) computer program.
However,

$$F^{*}= \frac{R^2(k-1)}{(1-R^2)(N-K)} \quad F(K-1, N-K)$$

Where,

R^2 = Coefficient of Multiple Determination

K = Total number of all parameters we have estimated
N = Sample size
H_0 = $\propto^{*}_1 = \propto^{*}_2 = \propto^{*}_3 \ldots \propto^{*}k$
H_1 = Not all of the above, that is $\propto^{*}$,Si = 1, 2.. K are zero.

Result obtained from F* shall then be compared with the theoretical F at a level of significance to be determined.

$U_1 = K-1$ and $U_2 = N - K$ degrees of freedom

Rule: If F*<F we reject the null hypothesis, which suggest that regression results are not useful (Maurice *et al*., 1999; Nyong, 1989).

Scale economies: The coefficient of fixed factors of production (number of branch offices were used to test scale economies in the insurance companies (Millioneaux, 1978; Nyong, 1989), if $\beta^{*}, \beta^{*}_1, \beta_{11} > 1$ increasing returns to scale when it is equal to one, it is constant and when less than one it is decreasing. If the sample size is less than 30 we use the student t-test.

Economic efficiency: The test of economic efficiency is based on the significance and magnitude of the size dummies MC, LC, as well as the Intercept term included in the regression equation the group with significant and larges value for the coefficient of the dummy variable is the more efficient.

H0 : Vi = 0 (where Vi = 1, 2 is coefficient of the dummies)
H1 : Vi # 0

$t^{*} = \frac{vi}{Qvi}$ Qvi is the standard error of the estimated parameters.

This value is compared to the theoretical (tabular) values of 't' which define the critical region in a two-tailed test, with n-k degrees of freedom. If t falls in the acceptance region that is if t 0.023 < t* < t.0.024 (with n-k degrees of freedom) we accept the null hypothesis that is Vi is not statistically significant at the 5% level.

Overall test of significance of a regression: To test for the overall explanatory power of regression measured by R^2 (coefficient of multiple determination).

F* ratio from ANOVA table provide by SPSS computer programe
However,

$$F^* = \frac{R^2 (K-1)}{(1-R^2)(N-K)} \quad F(K-1, N-K)$$

R^2 = Coefficient of multiple determination.
K = Number of parameters estimated.
N = Sample size.
H_0 = $\propto^*_1 = \propto^*_2 \propto^*_3 \ldots \propto^*_K$
H_1 = Not all of the above, that is $\propto^*_S$ I = 1, 2 ..

K are zero F* is compared with theoretical F(at a level of significance to be determined) with UI = K-1 and U2 = N-K degrees of freedom. If F*>F we reject the null hypothesis. If F* <F we accept the null hypothesis which suggest that regression results are useless (Maurice *et al*., 1999; Nyong, 1989).

RESULTS AND DISCUSSION

Table 1 shows result of the profitability equation, which puts the profit of the firm as a function of labour price input, price of capital, entrepreneur price and the size of the firms. From the result, it could be seen that there is an inverse relationship between labour input prices and the firm's profit, which means that as the price of labour that is used in the day to day activities of the firms increases, there would be an increase in the total cost of production and thereby resulted in reduction in the level of profitability of the firms. This labour price is in terms of wages and salaries of employees of the firms. As they tend to seek for additional salaries through their industrial union, the labour input price is -0.0871, which represents the labour price elasticity of firms profit and it shows an inelastic firm's would be reducing the level of profitability of the firm. The coefficient profitability, meaning that for every 1% increase in employees' salaries there would be about 9% reduction in the profitability level of the firm. This outcome confirm with the prior expectation. The t-statistic indicates that labour input price is insignificant to the model. The coefficient of

Table 1: Result of profitability equation

Variable	Coefficient	t-statistic	R^2 = 04519
C	-6830.8700	-0.1334	Adj R^2=0.4487
InLp	-0.0871	0.8623	S.E. =0.8523
Inkp	-0.1378	3.0264	F.Stat=20.73
inEp	-0.0279	-2.0178	D.Watson =1.8262
Mc	54113.5100	-1.9673	---
Lc	58760.7900	1.9767	---

Source: Data analysis, 2007

Table 2: Result of performance scale and market share

Variable	Coefficient	t-statistic	R^2 = 04519
C	-0.245670	-1.9701	Rdj R^2=0.5596
Inkp	-0.412300	2.9618	S.E. =1.2691
Inkp	-0.160200	-4.1167	F.Stat=16.1121
InPm	-0.916020	0.1291	D.Watson =2.1910
InMkt.S	1.294100	5.6186	
InZ	0.614900	-1.8917	
Mc	41.081700	-2.1106	
Lc	58760.7900		

Source: Data analysis, 2007

Table 3: Result of scale and performance

Variable	Coefficient	t-statistic	R^2 = 04519
C	9.6639	15.4993	Adj R^2=0.4571
InLp	1.25E-06	1.0103	S.E. =1.0137
InKp	1.30E-06	2.1976	F.Stat=21.41
InPm	1.56E-09	1.3368	D.Watson =1.9617
InC1	-3.69E-07	-.3681	
Mc	-0.9236	-2.7554	
Lc	0.8219	2.3394	

Source: Data analysis, 2007

capital price which is -0.1378 signifies that for every 1% increase in the cost of capital, there would be 13.7% decrease in the profit level of the firm, vice versa. The result shows that capital is an essential ingredient of firms' profitability.

Table 2 shows the result of the performance scale and market shares of the firm in the industry. The result shows that both the price of capital and labour has an increasing relationship with the level of performance and market share of the firms. This means that as the price of both inputs [capital and labour] tends to increase there would be a corresponding reduction in the market share of the firms, as this would decrease their generating capital and thereby a decline in the scale performance of the firms. From the table, capital price has the coefficient of -0.4123, which stands as the elasticity and it denotes that for every one percent increase in the input price there will be 41% decline in the scale of performance and market share of the firm which is inelastic. While, the price of labour input has the coefficient of -0.1602, which is also inelastic and denotes that for every 1% change in the labour input price there would be a corresponding 16% decline in the market share of the firms which ultimately reduces the scale performance of the firms. In a nutshell the results of the analysis show that for profit of a firm to increase at any given time, investors should make sure that they control their expenses on capital and that their

labour union do not ask for unreasonable salaries that would jump up the labour price which would translate to increase cost of production, thereby reducing the profit level of the firm.

In terms of the scope, scale and performance of the firms, Table 3 shows that labour input price has a direct relationship with scope, scale and performance, the reason for this is that as the amount paid on labour/ employees increases, it indicates that more hands are employ to the business which signifies that there is an expansion in the business. The labour input price has its coefficient as 1.24E-06, meaning that it is inelastic to the model, though it is statistically significant. But price of capital has an inverse relationship with scope, which is meaningful in the real sense of it, because based on economies of scale we should expect such relationship. That is, as investment expands, there would be a reduction in the price of capital.

The premium that the firms receive has positive relationship with scope, scale and performance of the firms. It has as its coefficient 1.56 E.09, indicating that the more the firm clients' increases, the more they pay the premium and thereby increase the size, scale and scope of the firm. Since one premium means a rise in the clients of the firm and increase in the client would definitely translate to a rise in the scale and size of the firm.

As expected, the claim to the firm has an increasing relationship with the scope, scale and performance of the firm. The claims variable has the coefficient of-3.696E-07, which indicates that the higher the claims, the lower the performance of the firms, that is, the more clients comes for their claims, the lower the performance of the firm. As they would relatively be insolvent and this would reduce their capacity to expand in scope and scale. However, the size of the firm is statistically significant to the study, meaning that they are relevant variables to the study.

The coefficient of determination indicates that about 46% of the changes in dependent variable are caused by the changes in the explanatory variable. There is no serial correlation in the model, given 1.9617 as the Durbin Watson, while F-statistic shows that the model as a whole, is statistically significant to the study.

CONCLUSION AND RECOMMENDATIONS

Following recapitalization process in the banking industry of the Nigerian financial sector, insurance industry has been penciled down for the same process. Insurance industry, much like banks serve as a conduit to economic development. However, insurance service patronage in Nigeria has not been too attractive either to the producers or even the consumers of insurance services. This study postulated that cost inefficiency is the bane of good performance in this industry. The cost structure analysis has therefore been carried out on twelve registered insurance companies and over a five year period of operations. This study, also estimated a cost performance model to obtain such results as follows:-

There is an inverse relationship between labour input price and the firms' profit. Not only this, -0.0871 coefficient recorded for labour input price shows the inelastic nature of the firms' profitability, implying that there would be about 9% decrease in the profitability level of the firms. The same situations hold both for capital price and entrepreneurship. However, size has a positive relationship with the performance; the higher the scale of operations, the higher the level of performance

From Table 2, also market share coefficient is 1.2941; this means that market share has a direct relationship with the scale of performance. I other words, as the firm gain or increase its share in the market, it would lead to additional profit and thereby lead to an increase in the performance of the firms. The result also shows that for every 1% rise in the market share of the firms, there would be over 12% changes in the performance scale. This shows that the market share has a significant impact on performance of the market share which is statistically significant to the model.

Table 2 also shows that the size of the firms has a significant impact on the performance and market share of the firm. This means that as the firms grow in size, strength and branches, they tend to increase their market share in the market and thereby increase their level of performance in the industry.

The coefficient of determination R^2_1 is about 58%; meaning that about 58% of the changes seen in the performance and market share of the firms are caused by the selected explanatory variables. The results also show that there is minimum standard error in the model, with around 1.2891 and the figure of the Durbin Watson, which is 2.1910. This means that the error terms do not take from one another.

In a nutshell the results of the analysis show that for profit of a firm to increase in any given time, investors should make sure that they control their expenses on capital and that their labour union do not ask for unreasonable salaries that would jump up the labour price which would translate to increased cost of production, thereby reducing the profit level of the firm.

Also, efforts should be made to expand the business as their investment so that they can increase in size and strength and also increase their control of the market share.

The coefficient of determination, R^2, indicates that the explanatory variables that were used in this model accounted for 45% changes in the profit level of insurance firms. This means that though the selected explanatory variables are relevant, there are still other variables that would account for changes in the profit level of the firms that are not considered in the study. The standard error of the model is pretty small in relative terms. While the validity Test, F-statistic, indicates that the model is statistically significant to the study and that there is relatively little auto-correlation in the model.

Table 2 shows the result of the performance scale and market shares of the firms in the industry. The result shows that both the price of capital and labour has an increasing relationship with the level of performance and market share of the firms. This means that as the price of both inputs (capital and labour) tends to increase, (that is, if the cost of building, equipment and facilities that is used in the business, as well as the salaries and wages of employees increase), there would be a corresponding reduction in the market share of the firms, as this would decrease their generating capital and thereby a decline in the scale performance of the firms. From Table 2, capital price has the coefficient of -0.41423, which stands as the elasticity and it denotes that for every one percent increase in the input price of capital there will be 41% decline in the scale of performance and market share of the firm (It is inelastic). While, the price of labour input has the coefficient of -0.1602, which is also inelastic and denotes that for every 1% change in the labour input price there would be a corresponding 16% decline in the market share of the firms which ultimately reduces the scale performance of the firms.

Based on the results of the estimated model, it could be reported that most Nigerian insurance firms operations are still cost inefficient. The analysis of assets and liabilities tables presented in the previous chapter confirmed the urgent need to recapitalize insurance firms such that their scale of operations could be expanded in order to enjoy economies of scale. With less than N1 billion estimate, about 80% of our selected firms fall below this minimum. With the market share confident of 1.2941, it implies that the firms in this work would increase their share in the finance market with additional profits and enhance the performance level. As firm increases in size, strength and branches, the performance level also increases.

There is an urgent need for recapitalization process in the Nigerian insurance industry. It would be better to have fewer number of strong capital based firms than many whose cost of production are be sub-optimal.

As the cost of operation / production is very high in this industry, the mergers and acquisition can serve as panacea to revamp the industry from its imminent collapse. The consolidated firms can then take advantages of large production as well as positive synergies that would be created by such exercise.

Insurance can be enjoyed only when such multi-product businesses are well delivered. In a developing market, it might be recommended that insurance firm should rather specialize in the production of service where it has comparative cost advantage, especially for non-homogenous services such as oil and gas.

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