# Demand for Reinsurance and Solvency of Insurance Business in Nigeria: An Empirical Analysis

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**Abstract**
*The importance of reinsurance in the insurance business cycle cannot be overemphasized. The benefits of reinsurance include increased capacity, technical expertise, allocation of risks and limitation of financial distress. However, as an insurer gathers more underwriting experience, it is expected that less reinsurance is demanded. Hence, frequent demand may be a sign of insolvency because it simultaneously reduces the variability of cash flows and financial leverage. The purpose of this research is to investigate if the excessive use of reinsurance is an indication of insolvency in the Nigerian insurance industry. Using purposive sampling techniques, ten (10) general insurance companies were selected from forty-nine (49) operating in Nigeria. Returns on assets (ROA), Returns on equity (ROE) and size were used as indicators to measure the level of solvency while product diversification, claims ratio, combined ratio, reinsurance price, liquidity ratio and expense ratio were used as indicators to measure demand for reinsurance by primary insurers. The findings of the study reveal that there is significant relationship between the solvency and demand for reinsurance, though product diversification, combined ratio and reinsurance price are more significant than loss ratio, liquidity ratio and expense ratio. It is recommended that primary insurer should be more concerned about its concentrated business mix, combined ratio and the price (premium) of reinsurance.*

**Key words:** Reinsurance, solvency, primary insurer, cedant

## Introduction

The fear of the possibility of an adverse condition that deviates from a desired outcome underpins the demand for insurance and explains the reason why insurance has grown steadily in importance (Vaughan & Vaughan, 1998). According to Casteris (2005), what distinguishes the insurance industry from other industries is that it operates on an inverse cycle. Therefore, insurance companies need to form an expectation about the future before risks can be accepted (Lelyveld, Liedorp & Kampman, 2009). This is however hinged on the fact that if too much risks are accepted, premium received may be insufficient to cover the required pay outs which may lead to financial distress. Therefore, insurance companies often transfer part of the risk to another carrier called reinsurer.

Reinsurance, according International Association of Insurance Supervisors (IAIS) (2006), is an insurance contract between one insurer (reinsurer) and another insurer (cedant) to indemnify against losses on one or more contracts issued by the cedant in exchange for a consideration. The purpose of reinsurance according to (Redja, 2008) is to reduce the financial cost to insurance companies arising from the potential occurrence of specified insurance claims, enhancing innovation, competition and efficiency.

As good as reinsurance business is, frequent demand by insurance companies may be due to solvency problems. This view is supported by Burca and Batrinca (2014). They assert that the process of risk transfer to reinsurer might be expensive because the cost of reinsurance might be higher than the actuarial rate of the transferred risk, especially for insurance company that

have spent reasonable year with considerably underwriting experience. Hence, the use of reinsurance may signal the extent of risk faced by insurance companies (Chen, Hamwi & Hudson, 2001).

Though few works had been done on the negative effect reinsurance demand might have on the solvency of insurance companies (Chen et al, 2001; Hoerger, Sloan & Hassan, 1990; and Froot, 2001) but no known work has been done to study whether excessive demand for reinsurance may be a sign of insolvency for insurance companies operating in Nigeria. This paper aims to fill this gap. By ceding insurance to reinsurer, insurance company tends to diversify its underwriting risk and improves its solvency. But this may lead to a negative effect on the long run. The purchase of reinsurance leads to shortage of capital primary insurer possesses (Chen et al, 2001) which further affect its solvency. It further drives-up the price of reinsurance. Hoerger, Sloan and Hudson (1990) also assert that bankruptcy cost can make reinsurance to be demanded by an insurance company even if an insurance company is risk neutral. A less solvent insurer tends to use more reinsurance because of its inability to raise needed capital in financial markets (Chen et al, 2001). Therefore, overuse or abuse of reinsurance by some primary insurer can be considered as a signal that the primary insurer is in trouble.

The broad objective of the study is to find out if excessive demand for reinsurance by the primary insurer is an indication that the solvency of an insurance company is threatened. The study also intends to find out if there is any significant relationship between solvency of Nigerian insurance companies and demand for reinsurance. The hypotheses for this study are formulated to find out whether there is no significant relationship between the solvency of the Nigerian insurance company and demand for reinsurance and test whether there is no significant relative effect of solvency factors on the demand for reinsurance by Nigerian insurance companies

**Conceptual Framework**

Adequate understanding of the concept of reinsurance is widely recognized as important in insurer's risk and capital management. It has become increasingly important as a result of the insurance companies' concern about the inadequate capacity of bearing large losses (Burca & Batrinca, 2014). Swiss Re (2006), and Meier and Outreville (2006) identify two forms of reinsurance arrangements which are facultative reinsurance and obligatory reinsurance. Facultative reinsurance is an arrangement where primary insurer is free to choose which particular individual risks it wants to reinsure. The reinsurer, on its part, is also free to accept or refuse any risk offered to it, hence the term facultative (Redja, 2008). While in obligatory reinsurance, the direct insurer is obliged to cede to the reinsurer a contractually agreed share of the risk as defined in the reinsurance treaty and reinsurer is obliged to accept that share (Swiss Re, 2006).

Solvency of insurance companies is crucial for an insurance system to function (Fazzolari, 2009). According to Charumathi (2012), solvency refers to insurance company's ability to pay claims. Therefore, solvency depends on whether sufficient technical reserves have been set up for the obligations entered into and whether the company has adequate capital as security (Kansal, 2004). From this view, Pentikainen (1976) argues that solvency can be viewed from two major perspectives: management point of view and supervisory point of view. Irrespective of the perspective, Fazzolari, (2009) posits that solvency of insurance company is closely connected to evaluation of liabilities, assets, the level of the premium of long term policies and reinsurance.

Solvency of an insurance company according to Hoerger et al (1990) can be tested through random fluctuation of claims, losses of investment, fluctuation of the basic probabilities of claims and their trends and miscellaneous risk like catastrophic losses.

Previous studies have examined many factors that may affect an insurance company's solvency. Some of factors include organizational age, premium growth, investment yields, underwriting results, expense ratio, loss reserve exposure and realized and unrealized (Kim, Anderson & Amburgey, 1995; Sharpe & Stadnik, 2008). Other include claims ratio (Hoerger et al, 1990), combined ratio (Browne & Hoyt, 1995), liquidity ratio (Kramer, 1996; Plantin, 2006), reinsurance price and net of reinsurance underwriting portfolio (Cummins & Song 2008), surplus ratio (Harrington & Nelson, 1986) and cash flow simulation (Chen & Wong 2004).

**Theoretical Review**

Various theories have analyzed the importance of reinsurance to insurance companies. Chen, Hamwi & Hudson (2001) query that frequent demand of reinsurance by insurance company poses fundamental questions to primary insurer like: how does reinsurance affect the probability of solvency of an insurance company? And does the use of reinsurance raise the frequency of insolvency of an insurance company?. Therefore, this research work is aligning with the theory that believes that incessant demand for reinsurance introduces the risks that threaten financial stability of insurance companies. (Krenn & Oschischnig, 2003; Cole & McCullough, 2006)

In their findings, Hoerger, Sloan and Hassan (1990) posit that insurance companies will reinsure in order to lower the risk of bankruptcy. In essence, they proved that given bankruptcy cost, reinsurance may be demanded even when the insurance company is risk-neutral. The finding reveals that insurer's surplus, size and volatility of losses affect the amount of reinsurance an insurance company purchases. Incessant demand for reinsurance according to Lelyveld, Leiedorp and Kampam (2009) introduces credit risk for an insurance company.

Doherty and Tinic (1981) ascertain that apart from capacity building which reinsurance is formally known for, demand for it may be due to capital structure of the insurance company. Hence, there is a strong positive relationship between capital structure, solvency and primary insurer's demand for reinsurance (Dionne & Triki, 2004). To buttress further, Graven and Tennant (2003) and Adams (1996) ascertain that reinsurance is used to a larger extent by smaller insurance companies and those with a higher financial leverage.

Kader, Adams and Andersson (2010) and Adams, Hardwizk and Zou (2008) find negative and statistically significant correlation between profitability and reinsurance. Insurers that are more profitable are able to better absorb large unexpected losses and are able to face financial pressures and therefore it is expected that more profitable insurers will demand less reinsurance.

Loss volatility is another factor that determines demand for reinsurance. The hypothesis that high loss volatility raises the demand for reinsurance was proven by Hoerger, Sloan and Hassan (1990). Financial strength of the reinsurance companies could be an influential factor of the reinsurance demand in addition to the reinsurance price. Although reinsurance provides insurers with underwriting risk transfer, it exposes insurances companies to credit risk. As the

financial strength or capital of reinsurance companies increases, the credit risk related to reinsurance for insurance companies will be lower.

**Material and Methods**

The Nigerian industry consists of forty-nine (49) general insurance companies. Ten (10) insurance companies were used for this study. The ten were further divided into market leaders and market laggards based on total gross premium written in 2012 and made available in Nigeria Insurance Digest (2013), a publication of Nigeria Insurers' Association. The assumption is based on the fact that the more capital an insurance company has, the less solvent it is and the more the risk it can assume. Data used for this study were derived from the audited financial statements of insurance companies between 2004 and 2013. Panel data methodology was adopted using Pooled OLS Model or Constant Coefficient Model. The demand for reinsurance (dependent variable) comprises demand for reinsurance, loss ratio, combined ratio, reinsurance price, liquidity ratio and expense ratio. Solvency (explanatory variable) comprises return on asset, return on equity and sizes of the companies.
The following models were considered:

Model I (**General- Combined dependent variable**)

$$\boldsymbol{DDRIN}_{it} = \beta_0^D + \beta_1^D \boldsymbol{ROA}_{it} + \beta_2^D \boldsymbol{ROE}_{it} + \beta_3^D \boldsymbol{SIZ}_{it} + \mu_{it}^D$$

**Individual dependent variable:**

Model II $\quad \boldsymbol{DDR}_{it} = \beta_0^d + \beta_1^d \boldsymbol{ROA}_{it} + \beta_2^d \boldsymbol{ROE}_{it} + \beta_3^d \boldsymbol{SIZ}_{it} + \mu_{it}^d$

Model III $\quad \boldsymbol{LOSSR}_{it} = \beta_0^L + \beta_1^L \boldsymbol{ROA}_{it} + \beta_2^L \boldsymbol{ROE}_{it} + \beta_3^L \boldsymbol{SIZ}_{it} + \mu_{it}^L$

Model IV $\quad \boldsymbol{COMR}_{it} = \beta_0^C + \beta_1^C \boldsymbol{ROA}_{it} + \beta_2^C \boldsymbol{ROE}_{it} + \beta_3^C \boldsymbol{SIZ}_{it} + \mu_{it}^C$

Model V $\quad \boldsymbol{REP}_{it} = \beta_0^R + \beta_1^R \boldsymbol{ROA}_{it} + \beta_2^R \boldsymbol{ROE}_{it} + \beta_3^R \boldsymbol{SIZ}_{it} + \mu_{it}^R$

Model VI $\quad \boldsymbol{LQR}_{it} = \beta_0^{Lq} + \beta_1^{Lq} \boldsymbol{ROA}_{it} + \beta_2^{Lq} \boldsymbol{ROE}_{it} + \beta_3^{Lq} \boldsymbol{SIZ}_{it} + \mu_{it}^{Lq}$

Model VII $\quad \boldsymbol{EXPR}_{it} = \beta_0^E + \beta_1^E \boldsymbol{ROA}_{it} + \beta_2^E \boldsymbol{ROE}_{it} + \beta_3^E \boldsymbol{SIZ}_{it} + \mu_{it}^E$

Definitions of Variables

| Variables | | Definitions |
|---|---|---|
| Dependent Variable in each model: | | |
| $DDRIN$ | - | Combined demand for reinsurance |
| $DDR$ | - | Demand for reinsurance |
| $LOSSR$ | - | Loss ratio |
| $COMR$ | - | Combined ratio |
| $REP$ | - | Reinsurance Price |
| $LQR$ | - | Liquidity ratio |
| $EXPR$ | - | Expense ratio |

Explanatory Variables:

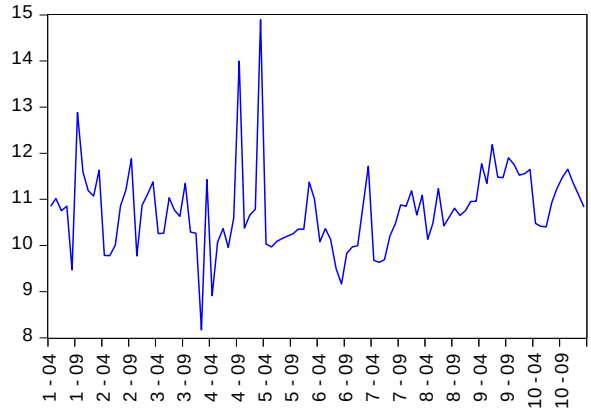
| | | |
|---|---|---|
| $ROA$ | - | Return on Assets |
| $ROE$ | - | Return on Equity |
| $SIZ$ | - | Size of each company |
| LER | - | Life Expectancy Rate |
| $u_{it}$ | - | Error term with respect to each model |

**Table no. 1**
**Results of Descriptive Statistics**

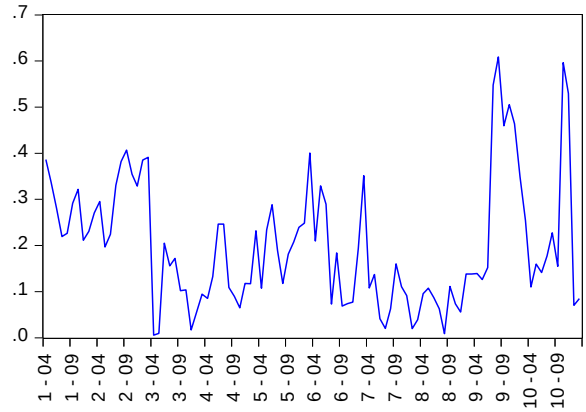
| | ROA | ROE | SIZ | DDR | LOSSR | COMR | REP | LQR | EXPR | DDRIN |
|---|---|---|---|---|---|---|---|---|---|---|
| Mean | 0.086958 | 0.330249 | 9.38576 | 0.200217 | 0.22858 | 0.53228 | 8.2836 | 3.70638 | 0.4484 | 10.76404 |
| Median | 0.047455 | 0.24011 | 9.44159 | 0.166235 | 0.20303 | 0.50078 | 8.47193 | 2.42985 | 0.28222 | 10.76343 |
| Maximum | 1.15353 | 3.23901 | 10.6207 | 0.60873 | 1.27632 | 1.66425 | 10.9301 | 25.1085 | 7.41323 | 14.89504 |
| Minimum | -0.23725 | -1.31803 | 7.01412 | 0.00566 | 0.01122 | 0.14767 | -7.59385 | 0.34054 | 0.02169 | 8.169162 |
| Std. Dev. | 0.1741 | 0.505344 | 0.56853 | 0.138471 | 0.14048 | 0.24697 | 1.80703 | 3.39843 | 0.92007 | 0.911194 |
| Skewness | 3.631289 | 3.284452 | -0.84882 | 0.942699 | 4.30081 | 1.62101 | -6.82106 | 3.32703 | 6.47861 | 1.119318 |
| Kurtosis | 19.94234 | 21.10504 | 5.2443 | 3.404614 | 32.2527 | 7.41921 | 60.9775 | 18.5235 | 45.8216 | 7.646917 |
| Jarque-Bera | 1415.782 | 1545.596 | 32.9951 | 15.49349 | 3873.77 | 125.167 | 14781.2 | 1188.56 | 8339.9 | 110.8556 |
| Probability | 0.000000 | 0.000000 | 0.000000 | 0.000432 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| Sum | 8.695773 | 33.02493 | 938.576 | 20.02174 | 22.8576 | 53.2278 | 828.36 | 370.638 | 44.8403 | 1076.404 |
| Sum Sq. Dev. | 3.000779 | 25.28191 | 31.9993 | 1.898234 | 1.95363 | 6.03833 | 323.27 | 1143.39 | 83.8056 | 82.19726 |
| Observations | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

*Source: E-view version 8*

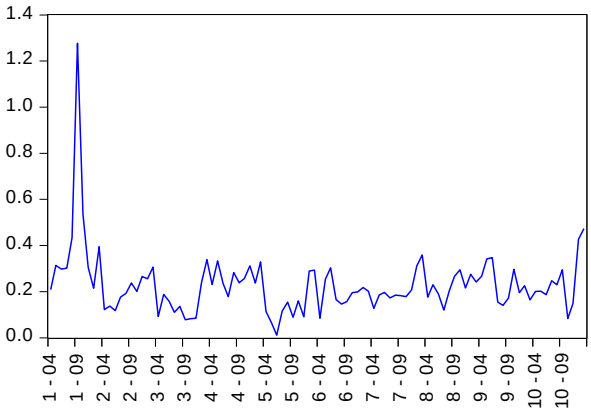
DDRIN



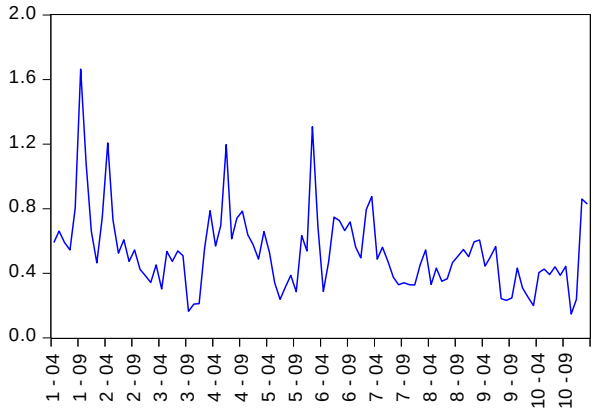

DDR



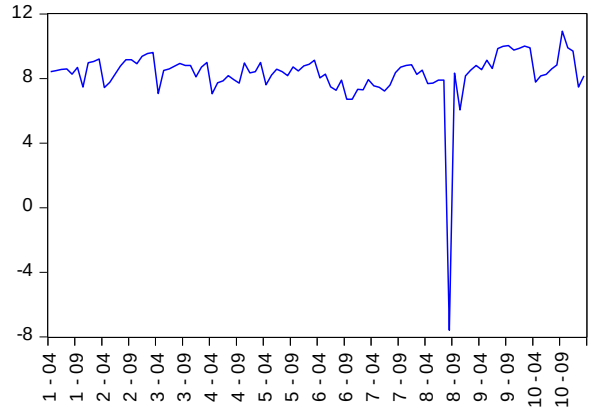

LOSSR

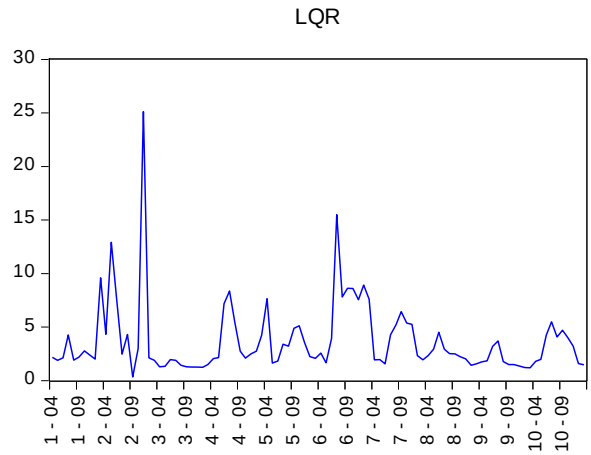


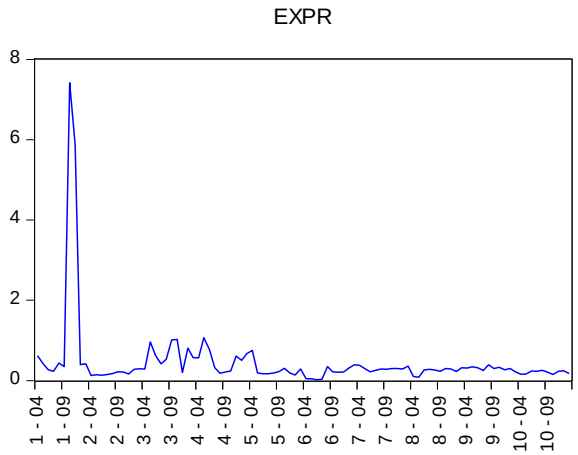

COMR

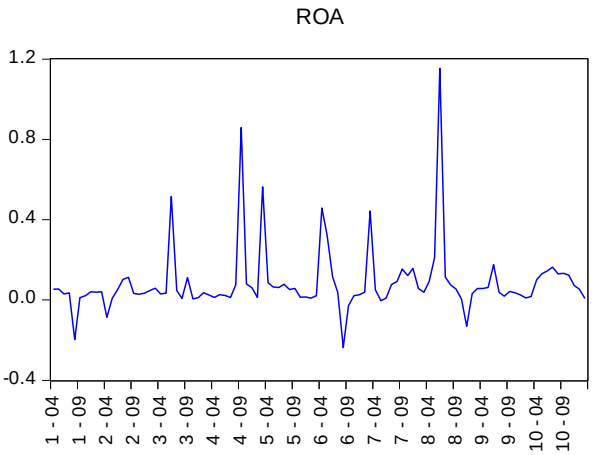


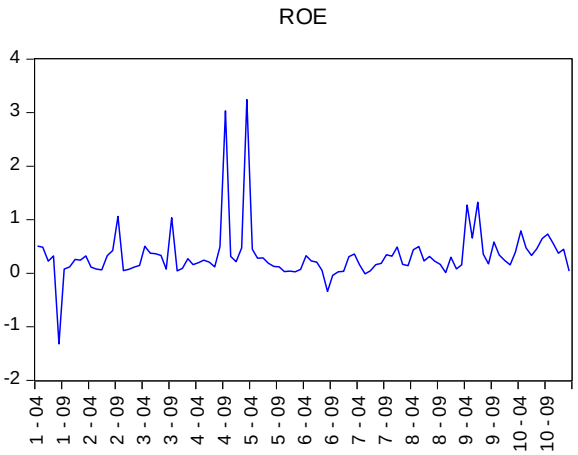

REP

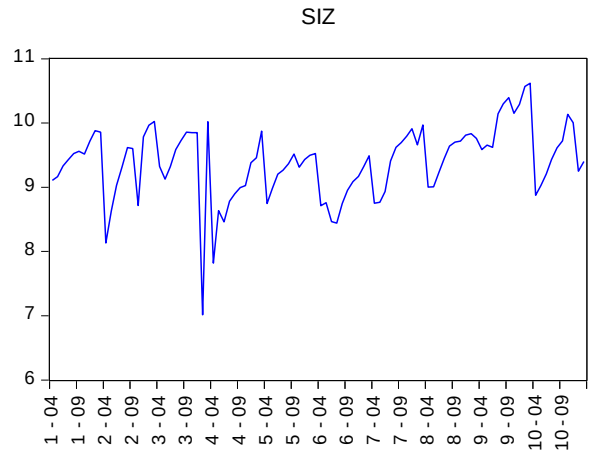





The above panel data graphs show that the variables are stationary. This means that the mean and variance of each of the variable are time invariant.

**Test of Hypotheses**

***Hypothesis One***

There is no significant relationship between the solvency of the Nigerian insurance company and demand for reinsurance.

Table 2. Demand for reinsurance and solvency

$$\widehat{DDRIN}_{it} = 1.409 + 0.726\widehat{ROA}_{it} + 1.018\widehat{ROE}_{it} + 0.654\widehat{SOZ}_{it}$$

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 1.409078 | 0.637675 | 2.209710 | 0.0295 |
| ROA | 0.725733 | 0.264186 | 2.747047 | 0.0072 |
| ROE | 1.018221 | 0.091300 | 11.15245 | 0.0000 |
| SIZ | 0.954167 | 0.067927 | 14.04700 | 0.0000 |

| | | | |
|---|---|---|---|
| R-squared | 0.830548 | Mean dependent var | 10.76404 |
| Adjusted R-squared | 0.825253 | S.D. dependent var | 0.911194 |
| S.E. of regression | 0.380905 | Akaike info criterion | 0.946643 |
| Sum squared resid | 13.92849 | Schwarz criterion | 1.050850 |
| Log likelihood | -43.33217 | Hannan-Quinn criter. | 0.988818 |
| F-statistic | 156.8440 | Durbin-Watson stat | 1.017025 |
| Prob(F-statistic) | 0.000000 | | |

*Source: Researchers (2016)*

***Hypothesis Two***

There is no significant relative effect of solvency factors on the demand for reinsurance by Nigerian insurance companies

Table 2.1. Demand for reinsurance and relative effect of solvency factors

Model II - Estimated equation: $\widehat{DDR}_{it} = -0.568 - 0.025\widehat{ROA}_{it} - 0.004\widehat{ROE}_{it} + 0.082\widehat{SOZ}_{it}$

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -0.567513 | 0.221402 | -2.563270 | 0.0119 |
| ROA | -0.024756 | 0.091726 | -0.269893 | 0.7878 |
| ROE | -0.004536 | 0.031700 | -0.143089 | 0.8865 |
| SIZ | 0.082186 | 0.023584 | 3.484793 | 0.0007 |

| | | | |
|---|---|---|---|
| R-squared | 0.115458 | Mean dependent var | 0.200217 |
| Adjusted R-squared | 0.087816 | S.D. dependent var | 0.138471 |
| S.E. of regression | 0.132251 | Akaike info criterion | -1.169055 |
| Sum squared resid | 1.679067 | Schwarz criterion | -1.064848 |
| Log likelihood | 62.45274 | Hannan-Quinn criter. | -1.126880 |
| F-statistic | 4.176927 | Durbin-Watson stat | 0.773592 |
| Prob(F-statistic) | 0.007958 | | |

Source: Researchers (2015)

Table 2.2
Model III - Estimated equation: $\widehat{\boldsymbol{LOSSR}}_{it} = -0.039 - 0.061\widehat{\boldsymbol{ROA}}_{it} + 0.007\widehat{\boldsymbol{ROE}}_{it} + 0.02\widehat{\boldsymbol{SOZ}}_{it}$

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.039173 | 0.237389 | 0.165016 | 0.8693 |
| ROA | -0.061022 | 0.098349 | -0.620458 | 0.5364 |
| ROE | 0.007180 | 0.033988 | 0.211237 | 0.8331 |
| SIZ | 0.020493 | 0.025287 | 0.810393 | 0.4197 |

| | | | |
|---|---|---|---|
| R-squared | 0.011943 | Mean dependent var | 0.228576 |
| Adjusted R-squared | -0.018934 | S.D. dependent var | 0.140477 |
| S.E. of regression | 0.141800 | Akaike info criterion | -1.029617 |
| Sum squared resid | 1.930301 | Schwarz criterion | -0.925411 |
| Log likelihood | 55.48087 | Hannan-Quinn criter. | -0.987443 |
| F-statistic | 0.386783 | Durbin-Watson stat | 1.109572 |
| Prob(F-statistic) | 0.762765 | | |

Table 2.3: Model IV Estimated equation

$$\widehat{\boldsymbol{COMR}}_{it} = 1.937 - 0.188\widehat{\boldsymbol{ROA}}_{it} + 0.016\widehat{\boldsymbol{ROE}}_{it} - 0.149\widehat{\boldsymbol{SOZ}}_{it}$$

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 1.937418 | 0.392569 | 4.935231 | 0.0000 |
| ROA | -0.188490 | 0.162640 | -1.158940 | 0.2494 |
| ROE | 0.015577 | 0.056207 | 0.277136 | 0.7823 |
| SIZ | -0.148512 | 0.041817 | -3.551431 | 0.0006 |

| | | | |
|---|---|---|---|
| R-squared | 0.125782 | Mean dependent var | 0.532278 |
| Adjusted R-squared | 0.098463 | S.D. dependent var | 0.246968 |
| S.E. of regression | 0.234494 | Akaike info criterion | -0.023591 |
| Sum squared resid | 5.278815 | Schwarz criterion | 0.080615 |
| Log likelihood | 5.179571 | Hannan-Quinn criter. | 0.018583 |
| F-statistic | 4.604154 | Durbin-Watson stat | 1.191112 |
| Prob(F-statistic) | 0.004700 | | |

Table 2.4 Model V - Estimated equation

$$\widehat{REP}_{it} = 1.096 - 0.437\widehat{ROA}_{it} + 0.283\widehat{ROE}_{it} + 0.760\widehat{SIZ}_{it}$$

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 1.096297 | 2.969695 | 0.369162 | 0.7128 |
| ROA | -0.437184 | 1.230333 | -0.355338 | 0.7231 |
| ROE | 0.283198 | 0.425191 | 0.666049 | 0.5070 |
| SIZ | 0.759853 | 0.316339 | 2.402019 | 0.0182 |
| R-squared | 0.065534 | Mean dependent var | | 8.283600 |
| Adjusted R-squared | 0.036331 | S.D. dependent var | | 1.807027 |
| S.E. of regression | 1.773898 | Akaike info criterion | | 4.023414 |
| Sum squared resid | 302.0845 | Schwarz criterion | | 4.127620 |
| Log likelihood | -197.1707 | Hannan-Quinn criter. | | 4.065588 |
| F-statistic | 2.244140 | Durbin-Watson stat | | 1.825015 |
| Prob(F-statistic) | 0.088083 | | | |

Source: Researchers

Table 2.5 Model VI - Estimated equation

$$\widehat{LQR}_{it} = 12.373 + 1.02\widehat{ROA}_{it} - 0.789\widehat{ROE}_{it} - 0.905\widehat{SIZ}_{it}$$

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 12.37279 | 5.671625 | 2.181525 | 0.0316 |
| ROA | 1.019950 | 2.349732 | 0.434071 | 0.6652 |
| ROE | -0.788928 | 0.812043 | -0.971534 | 0.3337 |
| SIZ | -0.905048 | 0.604155 | -1.498039 | 0.1374 |

| | | | |
|---|---|---|---|
| R-squared | 0.036333 | Mean dependent var | 3.706377 |
| Adjusted R-squared | 0.006218 | S.D. dependent var | 3.398432 |
| S.E. of regression | 3.387850 | Akaike info criterion | 5.317446 |
| Sum squared resid | 1101.843 | Schwarz criterion | 5.421653 |
| Log likelihood | -261.8723 | Hannan-Quinn criter. | 5.359621 |
| F-statistic | 1.206476 | Durbin-Watson stat | 1.564090 |
| Prob(F-statistic) | 0.311640 | | |

Source: (Researchers, 2015)

Table 2.6 Model VII – Estimated equation

$$\widehat{EXPR}_{it} = -0.123 - 0.320\widehat{ROA}_{it} + 0.022\widehat{ROE}_{it} + 0.063\widehat{SOZ}_{it}$$

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -0.122778 | 1.560420 | -0.078683 | 0.9374 |
| ROA | -0.320455 | 0.646476 | -0.495696 | 0.6212 |
| ROE | 0.021904 | 0.223416 | 0.098042 | 0.9221 |
| SIZ | 0.063054 | 0.166220 | 0.379343 | 0.7053 |
| R-squared | 0.004790 | Mean dependent var | | 0.448403 |
| Adjusted R-squared | -0.026310 | S.D. dependent var | | 0.920066 |
| S.E. of regression | 0.932091 | Akaike info criterion | | 2.736405 |
| Sum squared resid | 83.40419 | Schwarz criterion | | 2.840612 |
| Log likelihood | -132.8203 | Hannan-Quinn criter. | | 2.778580 |
| F-statistic | 0.154022 | Durbin-Watson stat | | 1.042091 |
| Prob(F-statistic) | 0.926867 | | | |

Sources: (Researchers, 2015)

**Discussion of Findings**

Table 1 tests whether there is no significant relationship between solvency of the Nigerian insurance company and demand for reinsurance. The estimated regression equation shows that there is a positive relationship between $DDRIN$ (demand for reinsurance, loss ratio, combined ratio, reinsurance price, liquidity ratio and expense ratio) and each of the explanatory variables; $ROA$, $ROE$, $SIZ$. Based on the t-statistic and P-value, each of the explanatory variables is statistically significant. The Adjusted R-square shows that 82.5% of the variation in dependent variables, $DDRIN$, is determined by the explanatory variables. The F-statistic shows that the overall regression is significant. This implies that the explanatory variables ($ROA$, $ROE$, $SIZ$) are the main determinants of the dependent variable $DDRIN$. This result shares convergent views with Curak and Kramaric, (2014) who assert that when an

insurance company cedes risks to a reinsurer the ceding firm simultaneously reduces the variability of its cash flows and it financial leverage.

Tables 2.1-2.6, test whether there is no significant relative effect of solvency factors on the demand for reinsurance by Nigerian insurance companies. Each dependent variable was calculated against the explanatory variable in order to find out the most important of the independent variables.

Table 2.1 shows that there is a negative relationship between $DDR$ and each of the explanatory variables; $ROA$ and $ROE$, but positive relationship with $SIZ$. The F- statistic shows that the overall regression is significant. This implies that $ROA$, $ROE$ and $SIZ$ are the main determinants of demand for reinsurance. The demand according to Cole and McCullough (2006) is backed by product diversification approach by insurance companies. In essence, an insurer with less concentrated business mix is expected to reinsure more.

However, table 2.2 depicts that there is a negative relationship between $LOSSR$ and $ROA$ and a positive relationship between $LOSSR$, $ROE$, and $SIZ$. The F-statistics shows that the overall regression is insignificant. In other words, an increased in volatility of claims irrespective of the size, return on asset and return on equity of an insurance company can give rise to increased reinsurance demand (Hoerger et al, 1990).

Table 2.3 shows that F-statistic that the overall regression is significant. This implies that the $ROA$, $ROE$, $SIZ$ have significant effect on the dependent variable $COMR$. Therefore, the ratio of management expenses over gross premium written will determine whether an insurer will demand for reinsurance or not. Chen et al (2001).

Table 2.4 shows that there is a negative relationship between $REP$ and $ROA$ and a positive relationship between $REP$ and $ROE$, $SIZ$. Based on the t-statistic and P-value, $SIZ$ is statistically significant while $ROA$ and $ROE$ are statistically insignificant. The F-statistic shows that the overall regression is significant. This implies that the explanatory variables $ROA$, $ROE$, $SIZ$ have significant effect on the dependent variable $REP$. Therefore, premium charged by the reinsurer can determine whether reinsurance will be demanded or not.

However, the estimated regression equation in table 2.5 shows that there is a negative relationship between $LQR$ and $ROE$, $SIZ$; and a positive relationship between $LQR$ and $ROA$. Based on the t-statistic and P-value, all the explanatory variables are statistically insignificant. The F-statistic shows that the overall regression is insignificant. This implies that $ROA$, $ROE$, $SIZ$ do not have significant effect on the dependent variable $LQR$. This result contradicts with view of Plantin (2006) who asserts an insurer with relative assets has more stable finances and expected to use less reinsurance.

Table 2.6 shows that there is a negative relationship between $EXPR$ and $ROE$, $SIZ$; and a positive relationship between $EXPR$ and $ROA$. The Adjusted R-square shows that 0.4% of the variation in dependent variable, $EXPR$, is determined by the explanatory variables. The F-statistic shows that the overall regression is insignificant. This implies that the explanatory variables $ROA$, $ROE$, $SIZ$ do not have significant effect on the dependent variable $EXPR$.

**Implications of Findings, Limitations and Suggestions for Further Studies**

Based on the analysis, there is a joint significant relationship between variables for demand for reinsurance (demand for reinsurance, loss ratio, combined ratio, reinsurance price,

liquidity ratio and expense ratio) and solvency (Return on Asset, Return on Equity and Size). This finding is in consonance with the view of Lelyveld, Leiedorp and Kampam (2009) who posit that size and volatility of losses may affect the amount of reinsurance an insurance company purchases. This view is further shared by Doherty and Tinic (1981), Dionne and Triki (2004) and Adams (1996) who believe that there is a strong positive relationship between capital structure, solvency and primary insurer's demand for reinsurance.

This study further finds out that there is a strong combined relationship between solvency and demand for reinsurance, not all individual explanatory variables have significant effect on the dependent variable. In this case, product diversification, combined ratio and reinsurance price are more significant than loss ratio, liquidity ratio and expense ratio. Therefore, apart from the fact that reinsurance can be purchased in order to stabilize loss experience, increase underwriting capacity, provide protection for catastrophic losses, provide technical assistance in the underwriting activities and claims handling, it can also be bought when a primary insurer is insolvent which can be through excessive product diversification, high combined ratio, high reinsurance price, high loss or claims ratio, high liquidity ratio and high management expenses.

Due to the high reliance on secondary data for this study through annual reports of insurance companies in Nigeria, the financial results gathered may be prone to manipulation and may be susceptible to corporate governance misconduct. The number of observation (ten companies) out of forty-nine may also be a major limitation. Therefore, larger insurance may be included in subsequent studies in order to have a more reliable and dependable results.

**Conclusion**

This study reveals that the level of solvency that primary insurer possesses may determine the demand for reinsurance. Though, the role of reinsurance in the supply of insurance services cannot be overemphasized, it is unconnected to the fact that it strengthen the financial viability of primary insurers on the short run. Hence, a less solvent primary insurer tends to use more reinsurance because of its inability to raise needed capital (Chen et al, 2001). Therefore, primary insurance must be solvent in the running of its business and raise enough capital internally and externally. Capital can be raised through diversification of related business, adherence to strict indemnity ethics and public initial offer. Efforts geared at improving corporate governance in order to reduce management expenses may add more to the bottom line of a primary insurer.

In conclusion, on the long run, primary insurers' demand for reinsurance is a function of the level of diversification, loss ratio experience, combined ratio experience, reinsurance premium, expense ratio experience and the level of its liquidity.

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