

Reinsurance and the determinants of the ceding decision of life insurance companies in Nigeria: An empirical analysis.

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ABSTRACT

Purpose: This paper is an empirical analysis of Nigeria's determinants of the ceding decision of life insurance companies. It is birthed from the notion that reinsurance, though highly beneficial to the insurance industry, is rarely undertaken by life insurers. Thus, this study aims at expounding on the determinants of reinsurance decisions of life insurance companies in Nigeria and the relationship of each determinant with ceded reinsurance.

Methodology: An ex-post facto research design was adopted, and a sample size of seven (7) core life insurance companies in Nigeria was selected using the purposive sampling technique. Data were sourced from the Nigerian Insurers Digest and the websites of the select insurance companies covering the years 2011 to 2019. Descriptive analysis and unit root tests were conducted on the data to justify its suitability. Data were further analyzed using the panel data regression, and a decision was arrived at using the Hausman and redundant fixed effect tests.

Results/Findings: The analysis showed a significant relationship between leverage and ceded reinsurance, firm size and ceded reinsurance, as well as return on assets and ceded reinsurance, while underwriting risk and reinsurance price had insignificant relationships with ceded reinsurance. All the explanatory variables also had positive relationships with the ratio of ceded reinsurance. Thus, it was concluded that leverage, firm size and return on assets are major determinants of the ceding decision of these companies, while underwriting risk and reinsurance price are not.

Originality and Practical Implications: This study is an original work of the authors. It practically shows the relationship between the factors considered by life insurers in deciding to cede their risks and ceded reinsurance. With previous studies on reinsurance and its benefit to the insurance industry, this study brings factors that impede the life insurer from deriving these benefits. Therefore, it was recommended that to encourage life insurers to cede more risks, policymakers and regulators should align specific regulations on leverage, firm size and return on assets of life insurers in Nigeria.

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1. INTRODUCTION

Reinsurance is a financial activity that plays a vital role in the insurance business. It is the transfer of liability from the primary (ceding) insurer to another insurer (the reinsurance company) through a process known as cession (Outreville, 1998 in Kramaric and Galetic, 2013). It is also known as the insurance of insurance companies. It occurs when an insurance company issues an insurance contract for another for risks beyond the primary insurer's retention level or catastrophic in probability or frequency of occurrence. Insurers purchase reinsurance cover for several reasons, such as broader distribution of risk (Kramaric and Galetic, 2013), higher underwriting capacity (Lee and Lee, 2012), reduction of the capital cost of insurance coverage and increased financial stability (Iqbal and Rehman, 2014), and maximization of expected utility (Cummins et al., 2021). In addition, its financial intermediation function promotes financial soundness and the stability of direct insurance markets (Tang and Weng, 2012). Reinsurance thus serves as a means of mitigating catastrophic loss while at the same time promoting risk diversification, risk financing and capital management (Harrington and Niehaus, 2000; Obalola and Abass, 2016).

Retention levels are an indication of an insurer's ceding decision. Kramaric and Galetic (2013) opine that insurance companies calculate their retention levels in tables of maximum coverage, taking into cognizance the total volume of business, the insurance premium for each class of insurance, and the amount of capital and capital adequacy. A high retention ratio is proof of a high risk-bearing capacity of the insurer, which implies that most of the risks are retained by the company without outsourcing to reinsurers (Obalola and Abass, 2016). In Nigeria, life insurance companies have consistently maintained high retention ratios compared to their non-life counterparts. In 2015, life insurance recorded a retention ratio of 92 per cent against 62 per cent in the non-life sector. Between 2016 and 2018, it toggled between 91 per cent and 94 per cent, with 91 per cent in 2019 (NAICOM, 2019b). This was against the 56 per cent retention rate recorded by the non-life sector in 2019. These ratios reflect the life business's growing underwriting and risk-bearing capacities. It also reflects the low patronage of reinsurance by the industry. Additionally, it shows the local content and domestication policies of the life business in Nigeria. As the benefits of reinsurance to the insurer are enormous and with the reluctance of life insurers to cede their risks, the researchers sought to explore the determinants of the ceding decision of life insurers in Nigeria and their relationship with ceded reinsurance.

The primary objective of this study is to analyze the relationship between the determinants of the ceding decision of life insurance companies in Nigeria and ceded reinsurance. Sub-objectives are to:

- (i) Investigate the relationship between underwriting risk and ceded reinsurance.
- (ii) Assess the relationship between leverage and ceded reinsurance.
- (iii) Determine the relationship between firm size and ceded reinsurance.
- (iv) Establish the relationship between reinsurance price and ceded reinsurance.

- (v) Assess the relationship between return on assets and ceded reinsurance of life insurers in Nigeria.

This study is of significance to both life insurers and reinsurers as it brings factors responsible for high retention ratios of life companies and how they can be mitigated. Insights from this study shall enable financial regulators and policymakers to enact policies encouraging life insurers to cede their risks. In addition, investors and experts would better identify the controlling determinants of reinsurance demand in their investment decision. However, this study is limited to life insurance companies in Nigeria and insurer-specific factors influencing their reinsurance decisions.

The rest of this paper is structured into a literature review, research methodology, results and discussion, conclusion and recommendation.

2. LITERATURE REVIEW

Literature is reviewed under the conceptual, theoretical and empirical frameworks.

2.1 Conceptual framework

2.1.1 Life insurance in Nigeria

Life insurance in Nigeria has evolved over the past couple of years. In the last decade, it has grown in its premium contribution to the insurance industry. From a 25 per cent contribution in 2011 (Nigerian Insurers Digest, 2011), it progressed to a 30 per cent contribution in 2014, 31 per cent in 2015, 38 per cent in 2016, 41 per cent in 2017, 42 per cent in 2018 and 45 per cent in 2019 (NAICOM, 2018, 2019b). This growth pattern is highly commendable, mainly because life insurance contributes to the Nigerian economy by generating essential long-term investible funds capable of aiding the growth and stability of the economy.

The growth of life insurance has mainly been contributed by the premium surge in the annuity arm of the business. The patronage of annuity has been aided by an influx of newly retired persons recently exposed to the plan and company-friendly regulations (Soye & Adeyemo, 2017). In addition, the consistent rules by NAICOM have been a direct measure targeted at raising public and consumer awareness on matters of claim and claim settlement which is a crucial boost of confidence in the sector (NAICOM, 2019b). Previously, the growth of the industry had been hampered by socio-economic factors such as poor health care services, high cost of living and poor economy (Mojekwu & Ibekwe, 2015); but growing awareness of the life business and increasing industry confidence have contributed to the growth of life insurance in Nigeria in recent times (NAICOM, 2019b).

The sector's recapitalization has also stimulated the industry's growth. As of 2019, the Nigerian Insurance industry has undergone three rounds of recapitalization as stipulated by the National Insurance

Commission (NAICOM). In 2003 when the insurance reform Act was signed into law, the minimum capital base for life insurance business was placed at N150 million. In 2005, it was raised to an N2billion, and in May 2019, it was further reviewed to N8 billion (NAICOM, 2019b; Akande, Samuel and Iyodo, 2020). These recapitalization exercises are targeted at increasing the strength and stability of the industry and enhancing more favourable competition with its contemporaries in the global insurance market. According to Ogege and Mojekwu (2013), this has helped in the continuous growth and expansion of the industry and, by extension, the local economy.

2.1.2 Reinsurance

According to Workie (2018), reinsurance is the transfer of part of the risks that a direct insurer assumes from an insured to a second insurance carrier, also known as the reinsurer, who, having no direct contractual relationship with the insured, agrees to cover the risk in exchange for a payment known as the reinsurance premium. Wehrhahn (2009:15) defines reinsurance as:

“A financial transaction by which risk is transferred (ceded) from an insurance company (cedant) to a reinsurance company (reinsurer) in exchange for a payment (reinsurance premium)”.

From these definitions, it can be deduced that reinsurance serves as the means of sharing potential risks assumed by the insurer with a secondary insurer to spread and minimize risk and leverage the business.

The act of reinsurance was first practised in marine insurance in the 14th and 15th centuries by marine insurers who tried to safeguard themselves against huge losses of insured ships/goods from perils at sea. As a result, these insurers often had to sell parts of the contract or risk to another, who served as the reinsurer in a bid to mitigate said risk (James and Joan, 2003 in Workie, 2018). Fire insurance was the next beneficiary of reinsurance protection, prompted by the huge losses recorded in the great fire of Hamburg (Holland, 2009).

Like insurance, reinsurance involves two major parties – the primary insurer or cedant and the reinsurer. The former's assets comprise the reinsurer's capital as a capital structure mix, while the latter holds more diversified portfolios geographically and across insurance lines (Plantin, 2006). Garven and Lamm-Tennant (2003) maintain that reinsurance purchase is a capital structuring decision to substitute capital and maintain an optimum level of risk in line with the insurer's capitalization. According to Weiss (2007) and Iqbal and Rehman (2014), this promotes client relationships without increasing insolvency risk while ensuring that the risk of unexpected loss is shared between the insurer and reinsurer. Moreover, it enables insurers to stabilize loss experience and increase their underwriting capacity while protecting against catastrophic loss and technical assistance in their underwriting operations.

2.1.3 Determinants of ceding decision

Insurers make their ceding decisions based on several factors. These factors can be grouped into insurer-specific and industry-specific factors. Cole and McCullough (2006) and Kader, Adams and Mouratidis (2010) affirm that firms have their reinsuring decisions constrained either by internal actuarial rules or external regulations. Marijana, Maja and Kramaric (2014) list insurer-specific factors as leverage, size, underwriting risk, investment returns and ownership structure. Mayers and Smith (1990) in Kader, Adams and Mouratidis (2010) include solvency risk and taxes to the list, while Workie (2018) provides asset volatility as one of the determinants. These determinants shall now be discussed in detail.

- (i) Financial leverage indicates the extent to which an insurer uses debt to finance its assets. Marijana, Maja and Kramaric (2014) maintain that higher leverage implies a higher risk of insolvency. Insurance companies with higher leverage have fewer funds to absorb financial and operational losses resulting from unexpected events. Thus, their reinsurance demand increases compared to those with lower leverage levels (Graven and Tennant, 2003; Workie, 2018).
- (ii) Underwriting risk is a risk assumed in the course of underwriting. According to Workie (2018), insurers are exposed to danger from underwriting, which they seek to guard against by maintaining optimal levels relative to capitalization levels. Thus, reinsurance becomes appealing to hedge against operational risk effectively. Lee and Lee (2012) assert that reinsurance improves the predictability of cash flows and lowers earnings volatility. To perform their contractual obligations, insurers ensure that both their financial capital and reinsurance or loss contingent capital align with actuarial settings, regulatory authorities and credit rating agencies, where available (Powell and Sommer, 2007; Kader, Adams and Mouratidis, 2010).
- (iii) Firm size: Mayers and Smith (1990) assert that the strength and ability of a firm could be reflected by its size. A large firm size implies a large number of units exposed to risk from which the law of large numbers would play itself out by reducing the deviation of actual losses from expected losses. Similarly, large firms can easily benefit from economies of scale and increase efficiency in underwriting, loss adjustment and claim settlement. Economies of scale enable insurers to reduce bankruptcy costs and encourage more efficient services. This reduces reinsurance demand (Abass and Obalola, 2018; Park, 2020). Moreover, large insurance companies can easily employ experts to assess their retained risk portfolio and purchase optimal reinsurance to reduce reinsurance transaction costs. They outperform smaller companies in achieving operational cost efficiency through increasing output and subsequent workflow (Lee and Lee, 2012). Life insurance companies, for instance, engage in consulting services on regulations or taxation, business strategy and explorative underwriting platforms. Smaller life companies may demand more real benefits for purchasing large amounts of reinsurance. Powell and Sommer (2007) report that these small companies produce higher default risks and are more likely to become insolvent. Higher default risk increases the demand for reinsurance. Thus,

these companies cede their risks to improve their risk-bearing efficiency, ensure less volatile cash flows, and guard against bankruptcy (Marijana, Maja and Kramaric, (2014); Park, 2020).

- (iv) **Reinsurance price:** It is believed that the cost of reinsurance determines the reinsurance decision of primary insurers. Cole and McCullough (2006) opine that an increase in reinsurance prices occasioned by heavy losses and subsequent decline in the overall supply of reinsurance could result in a decrease in reinsurance. On the contrary, Cummins et al. (2021), in their study of the cost and benefit of reinsurance, deduce that insurance companies are willing to pay high prices to purchase reinsurance to reduce underwriting risks. Cole and McCullough (2006) state that the combined ratio can be used as a proxy for reinsurance price, and it is expected to positively impact the demand for reinsurance.
- (i) **Return on Assets:** This shows the insurer's ability to utilize its resources (assets) to generate profit. According to Marijana, Maja and Kramaric (2014), insurance companies that have a greater return on investments have more capacity to absorb unexpected significant losses and do not face the problem of underinvestment, which is usually experienced by the former.

2.2 Theoretical review

2.2.1 The corporate demand theory (CDT)

This theory was first adopted for insurance companies by Mayers and Smith (1990) and was further used by Plantin (2006). It proposes that reinsurance is beneficial in the short run. In contrast, an over-reliance on reinsurance implies that the risk undertaken by the insurer is low and may be at a considerable cost. This portrays reinsurance as having positive and negative aspects. Proponents of the theory list the short-run benefits of reinsurance as risk sharing, risk hedging, reduction in loss volatility, increase in underwriting capacity, the spread of assumed risks to mitigate agency problems, improved earnings to reduce expected taxes and the provision of real advisory services (Cole and McCullough, 2006; Lee and Lee, 2012; Obalola and Abass, 2016). In addition, due to their expertise and knowledge, reinsurance companies can better provide information and professional advice to primary insurers on pricing and claims adjustment.

2.3 Empirical review

Many studies have been carried out on reinsurance in recent times. Obalola and Abass (2016) find a significant but negative relationship between the demand for reinsurance and ROA in their study on the need for reinsurance and the solvency of the insurance business in Nigeria. In contrast, Aduloju and Ajemunigbohun (2017) find a significantly positive relationship between reinsurance ceded and the ROA of insurance companies. Kramaric and Galetic (2013) studied reinsurance's influence on insurance companies' profitability in Austria, Croatia and Rome. They discovered that insurance companies in Croatia with a higher share of reinsurance premiums had lower levels of profitability (ROA). However,

a contrary result was obtained in Austria, where insurance companies with a higher percentage of ceded premiums reported higher levels of profitability.

Cole and McCullough (2006) conducted a study on the corporate demand for reinsurance aimed at investigating the state of the international reinsurance market on the need for reinsurance by property and casualty insurance companies in the United States. They discovered that insurers with higher profits depend less on reinsurance because of their increased financial capacity. The same study provides evidence that size negatively affects the purchase of reinsurance. This is in line with the works of Lei and Schmit (2010). In another analysis of the costs and benefits of reinsurance on property-liability insurers in the United States, Cummins et al. (2021) discovered that the purchase of reinsurance significantly increases the insurer's costs but substantially reduces the volatility of the loss ratio. They also observe that by purchasing reinsurance, insurers incur higher costs of insurance production but reduce underwriting risk. Graven and Tennant (2003) find a positive and direct relationship between reinsurance and leverage and between reinsurance and asset volatility. However, they observe an inverse relationship between reinsurance and investment returns and between reinsurance and claim costs.

Workie (2018) explored the relationship between insurer-specific factors and reinsurance demand in the Ethiopian insurance market. Using a sample size of eight non-life insurance companies between 2005 and 2016, a strong, positive significant relationship was discovered between financial leverage and reinsurance demand, as well as between asset volatility and reinsurance demand. On the contrary, an important negative relationship was observed between firm size and reinsurance demand. In extension, the study provided evidence that insurer-specific factors such as financial leverage, total asset volatility and underwriting risks are significant factors which affect the demand for reinsurance by Ethiopian insurers. Park (2020) examined the effect of company-specific features of Korean life insurance companies on reinsurance. Using a panel data analysis on 36 Korean life insurance companies for 18 years, it was observed that higher underwriting risk, lower solvency ratio, higher financial leverage and smaller firm size are related to increased purchase of reinsurance.

3. RESEARCH METHODOLOGY

The ex post facto research design is adopted for this study as it is based on already existing data that cannot be manipulated. This research design is justified because it allows the researcher to explore simple cause and effect relationships by avoiding artificiality in the research process, especially where the rigorous experimental approach is not possible (Sharma, 2019). The study's target population consists of 16 registered core life insurance companies in Nigeria as of 2019 (NAICOM, 2019a). The study period is nine (9) years, from 2011 to 2019, reflecting the last nine years before the COVID-19 pandemic and its attendant economic downturn.

The purposive sampling technique is adopted in selecting the sample size. This sampling method, also known as judgment sampling, is based on the qualities of the target population. According to Tongco (2007), with a purposive sampling technique, the researcher decides what needs to be known and sets out to find the sample from which the information can be obtained, either under knowledge or experience. Hence, using the purposive sampling method, seven core life insurance companies are selected based on their market share and premium income in the life insurance market. To create balanced panel data, the researchers ensured that the selected companies were in existence throughout the study period. The selected companies are African Alliance Insurance Company LTD, Capital Express Assurance Ltd, FBN Insurance LTD, Mutual Benefit Life Assurance Ltd, Standard Alliance Life Assurance Ltd, Zenith Life Assurance Ltd, and Royal Exchange Prudential Life Assurance. Data for this study are sourced from secondary sources obtained from audited statements of financial positions, income statements and revenue statements retrieved from the websites of the selected companies.

3.1 Description of variables

The variables used for the study, their description and apriori expectations are presented in Table 1.

Table 1: Description of variables

Variable	Description	Expected sign
Dependent variable The ratio of reinsurance ceded (RCR)	$\frac{\text{reinsurance premiums ceded}}{\text{Gross written premiums}}$	
Independent variables		
Underwriting risk (UR)	$\frac{\text{net incurred claims}}{\text{net earned premiums}}$	Positive (+)
Leverage (LVG)	$\frac{\text{total liabilities}}{\text{total assets}}$	Positive (+)
Firm size (FS)	log(total premiums)	Negative (-)
Reinsurance price (RP)	$\frac{\text{reins premiums} - \text{reins commission}}{\text{claims recovered from reinsurers}}$	Negative (-)
Return on assets (ROA)	$\frac{\text{net profit after tax}}{\text{Total assets}}$	Negative (-)

Source: Author’s composition from the works of Mayers and Smith (1990), Powell and Sommer (2007), Lee and Lee (2012), Workie (2018), and Park (2020)

3.2 Model specification

To achieve the objectives of this study, the researchers adopted a balanced panel data analysis. Hsiao (1985) in Lee and Lee (2012) asserts that using panel data provides a greater sample size and a higher degree of freedom, enhancing the efficiency of quantitative model variances. The authors agree that

panel data helps avoid the potential problem of omitted time-specific effects and provides more informative and robust parameter estimates than just time series or cross-sectional data. It also controls for individual heterogeneity, and there is a lesser degree of multicollinearity between variables (Creswell, 2009).

Panel data comprises both elements of cross sectional and time series data. In this study, the cross sectional component is represented by the selected seven core life insurance companies in Nigeria while the time series element is the period of 9 years for which this study is conducted. The model for this study is therefore presented as:

$$RCR_{it} = \beta_0 + \beta_1UR_{it} + \beta_2LVG_{it} + \beta_3FS_{it} + \beta_4RP_{it} + \beta_5ROA_{it} + \varepsilon_{it} \quad (1)$$

- Where RCR = ratio of ceded reinsurance
 UR = underwriting risk
 LVG = leverage
 FS = firm size
 RP = reinsurance price
 ROA = return on assets
 β = constant term
 ε = error term
 i = life insurance companies 1, 2...7
 t = time period 1, 2,...9

The error term can further be analyzed as:

$$\varepsilon_{it} = z_i + u_{it} \quad (2)$$

ε_{it} is the disturbance term with z_i being the unobserved insurance-specific effect and u_{it} being the idiosyncratic error as a one-way error component regression model.

4. DATA PRESENTATION AND ANALYSIS

In this section, data are presented, analyzed and discussed. The analysis consists of descriptive statistics, tests for stationarity and panel data regressions.

4.1 Descriptive statistics

The descriptive statistics for the explained and explanatory variables are presented in Table 2. The panel data set comprises seven life insurance companies over nine years, resulting in 63 observations.

Table 2: Descriptive statistics

	RCR	UR	LVG	FS	RP	ROA
Mean	0.099878	0.492110	0.611094	6.638502	1.457557	0.009352
Median	0.074200	0.388900	0.617000	6.579935	0.860500	0.027200
Maximum	0.534700	1.718300	1.280900	7.575484	11.61850	0.154900
Minimum	0.000800	0.065100	0.100800	5.970812	0.016900	-0.269500
Std. Dev.	0.099136	0.312932	0.210030	0.316851	2.112721	0.091935
Skewness	1.708494	1.766083	0.240383	0.495864	2.991857	-0.922455
Kurtosis	7.1995 96	6.682569	4.308155	3.564103	12.42350	3.683574
Jarque-Bera	76.94508	68.34847	5.098816	3.417057	327.0937	10.16129
Probability	0.000000	0.000000	0.078128	0.181132	0.000000	0.006216
Observations	63	63	63	63	63	63

Source: Author's computation from Eviews 9

From Table 2, the dependent variable, the ratio of ceded reinsurance (RCR), has a mean value of 0.099 and a standard deviation of 0.099. This shows that the variation of values of reinsurance ceded is closer to the mean value. Underwriting risk (UR) has a mean value of 0.492 and a standard deviation of 0.313, while reinsurance price (RP) has a mean of 1.457 and a standard deviation of 2.113. It can also be observed that the highest value of the return of assets (ROA) for the companies is 0.155, while the minimum value is -0.269.

The skewness measures the degree of asymmetry of the Series. From the table, leverage (LVG) and firm size (FS) with skewness values of 0.2 and 0.5, respectively, are symmetric around the mean. All other variables except ROA are positively skewed, implying that they are long right-tailed and have a tendency for higher values than the sample mean. ROA with a negative skewness of -0.922 has a long left tail and a preference for lower values than the sample mean. The measure of peakedness or flatness of the distribution is measured by kurtosis. As shown in Table 2, all the variables are leptokurtic with kurtosis values greater than 3. This represents peaked curves which are slim or long-tailed with higher values than the sample mean. The Jarque-Berra statistic tests the null hypothesis of a normal distribution. LVG and FS with Jarque-Berra probabilities of 0.07 and 0.18, respectively, which are greater than the 0.05 threshold, represent normal distributions. This tallies with the normal skewness exhibited by these variables. The other not normally distributed variables could be attributed to the high disparity of variations from the sample mean in the data.

4.2 Unit root analysis

Data were subjected to stationarity tests to test for unit root among the variables. The ADF and the PP-Fisher chi-square were used in testing for stationarity. Each statistic tests for the null hypothesis of a unit root against the alternative that the time series data on the respective variables are stationary. The result of the unit root analysis is presented in table 3.

Table 3: Unit root analysis

Variable	ADF			PP-Fisher chi-square		
	Statistic	Probability	Order of Integration	Statistic	Probability	Order of Integration
RCR	27.9648	0.0144	I(0)	31.3492	0.0050	I(0)
UR	23.8089	0.0483	I(0)	24.0562	0.0451	I(1)
LVG	23.4749	0.0530	I(2)	31.3463	0.0050	I(0)
FS	33.8250	0.0022	I(2)	48.5432	0.0000	I(0)
RP	19.1419	0.0436	I(2)	47.0293	0.0000	I(1)
ROA	23.4587	0.0532	I(0)	48.4811	0.0000	I(0)

Source: Author's computation from Eviews 9

From the unit root analysis presented in Table 3, all variables portray the absence of a unit root as they are all stationary. With the PP-Fisher chi-square statistic, all the variables except UR and RP were static at the level while UR and RP were standing at the first difference. With the ADF statistic, RCR, UR and ROA were fixed at the station while LVG, FS and RP were stationary at the second difference. The absence of a unit root clearly shows the lack of shocks in the model and the tendency for future statistical behavior to replicate past behavior.

4.3 Pooled ordinary least square regression

The pooled ordinary least square regression, referred to as pooled OLS, was carried out on the data for the main effect analysis. The result is presented in Table 4.

Table 4: Pooled OLS regression

Dependent Variable: RCR
Method: Panel Least Squares
Sample: 2011, 2019
Periods included: 9
Total panel (balanced) observations: 63

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.730284	0.366924	1.990284	0.0514
UR	-0.046829	0.050171	-0.933380	0.3546

LVG	0.075224	0.103827	0.724516	0.4717
FS	-0.100398	0.060478	-1.660066	0.0124
RP	0.006420	0.005684	1.129568	0.2634
ROA	0.406499	0.141085	2.881232	0.0056
<hr/>				
R-squared	0.302688	Mean dependent var	0.099878	
Adjusted R-squared	0.232749	SD dependent var	0.099136	
F-statistic	2.898045	Durbin-Watson stat	1.634280	
Prob(F-statistic)	0.021222			

Source: Author's computation from Eviews 9

Table 4 shows the result of the pooled OLS regression on the explained and explanatory variables. LVG, RP and ROA have a positive effect on the dependent variable. UR and FS with negative coefficients have a corresponding negative impact on the ratio of ceded reinsurance (RCR). ROA is both significantly and positively related to RCR. FS is significantly and negatively correlated. All other variables are statistically insignificant, recording p-values greater than 5 per cent.

The low R² value of 30.27 per cent is an indication that the pooled OLS may not be the best model for the data. This is supported by the fact that the pooled OLS focuses on the cross-sectional information and ignores the time variation in the data. This results in a correlated error. However, a Durbin-Watson statistic of 1.63, within the 1.5 – 2.5 ideal range, indicates the absence of serial correlation in the residuals. An F-stat probability of 0.02, which is also less than 0.05, shows that the explanatory variables are jointly significant in explaining the dependent variable (RCR) at a 5 per cent significance level. It adds to the goodness of fit of the model.

4.4 Fixed effect analysis

Data were further treated to the fixed effect data analysis. The limited effect model treats the unobserved individual heterogeneity (α_i) for each cross-section to be correlated with the explanatory variables. It involves a transformation to remove the unobserved effect, α_i , before the estimation. It assumes that the correlation between α_i and the independent variables is not equal to zero. The independent variables are considered fixed at any point in time and not subjected to change.

Table 5: Fixed effect analysis

Dependent Variable: RCR
Method: Panel Least Squares
Sample: 2011, 2019
Periods included: 9
Total panel (balanced) observations: 63

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.074367	0.401279	-0.185325	0.3537
UR	0.015710	0.049530	0.317180	0.1524

LVG	0.030441	0.103273	0.294765	0.0394
FS	0.020035	0.065277	0.306919	0.0402
RP	0.009157	0.006764	1.353651	0.1818
ROA	0.167274	0.162109	1.031861	0.0070

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.637634	Mean dependent var	0.099878
Adjusted R-squared	0.616340	SD dependent var	0.099136
F-statistic	3.608031	Durbin-Watson stat	2.018666
Prob(F-statistic)	0.000830		

Source: Author's computation from Eviews 9

The results indicate that all the independent variables have positive relationships with the dependent variable. LVG, FS and ROA with probability values of 0.0394, 0.0402 and 0.0070, respectively, are significantly related to RCR, while the remaining variables are insignificant. An R^2 of 0.6376 implies that changes in the independent variables collectively account for 63.76 per cent of RCR. A Durbin-Watson statistic of 2.01 indicates the absence of serial correlations in the model. An F-stat probability of 0.000830 shows that the model is a good fit and that the independent variables are jointly significant in explaining RCR at a 5 per cent significance level.

4.5 Random effect analysis

The random effect estimation assumes that the individual-specific effects are independent of the regressors and are included as the error term. The result of the random effect analysis is presented in Table 6.

Table 6: Random effect analysis

Dependent Variable: RCR
Method: Panel EGLS (Cross-section random effects)
Sample: 2011, 2019
Periods included: 9
Total panel (balanced) observations: 63
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.730284	0.325780	2.241649	0.0289
UR	-0.046829	0.044545	-1.051262	0.2976
LVG	0.075224	0.092184	0.816019	0.4179
FS	-0.100398	0.053696	-1.869725	0.0667
RP	0.006420	0.005046	1.272227	0.2085
ROA	0.406499	0.125265	3.245119	0.0020

Effects Specification

	SD.	Rho
Cross-section random	0.000000	0.0000
Idiosyncratic random	0.081969	1.0000

Weighted Statistics

R-squared	0.402688	Mean dependent var	0.099878
Adjusted R-squared	0.332749	SD dependent var	0.099136
F-statistic	2.898045	Durbin-Watson stat	1.634280
Prob(F-statistic)	0.021222		

Source: Author's computation from Eviews 9

The random effect analysis results reveal that UR and FS hurt the dependent variable while LVG, RP and ROA are positively related. All the variables are insignificantly associated with RCR except ROA, with a p-value of 0.0020. An R^2 of 40.27 per cent is also observed, which indicates the percentage change in the dependent variable that can be attributed to changes in the independent variables. Similar to the previous regressions, a Durbin-Watson value of 1.63 also confirms the absence of serial correlations in the model. An F-stat probability of 0.02 shows the level of significance of the standard F-test of the joint hypothesis that all the coefficients except the intercept are equal to zero. This adds to the goodness of fit of the model. The Hausman test was adopted to determine the best fit for the model out of the fixed and random effects.

4.6 Hausman test

This test is founded on the theory that either the fixed effect model or the random effect model is inconsistent with the data. Therefore, its null hypothesis is that the preferred model is the random effect. Thus, a p-value of less than 0.05 would lead to a rejection of the null hypothesis. The Hausman test for this analysis is presented in Table 7.

Table 7: Hausman test

Correlated Random Effects - Hausman Test			
Equation: Untitled			
Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	20.982614	5	0.0008

Source: Author's computation from Eviews 9

The Hausman test in Table 7 gives a probability of 0.0008, which is less than the 0.05 level of significance, so we reject the null hypothesis of a random effect and conclude that the fixed effect model is the better model of the two.

To confirm our result, the fixed effect model was tested against the pooled OLS to ascertain which model was more appropriate for the study. This was carried out using the redundant limited effect likelihood ratio. It tests the null hypothesis that the preferred model is the pooled OLS. Thus if the p-value is less than 0.05, the null hypothesis is rejected.

4.7 Redundant fixed effect test

Having chosen the fixed effect model as the preferred model using the Hausman test, the fixed effect has to be tested with the pooled OLS to determine which models are the most appropriate for the study. This is because while the pool OLS assumes that the intercepts are the same for each entity, the fixed-effect model recognizes the time-invariant differences between the entities. Brooks (2008) recommends the redundant fixed effects test to estimate the model with limited firm effects and allow for latent firm-specific heterogeneity. This would also allow the intercept in the regression model to differ among cross-sections (Workie, 2018). The redundant fixed effect test is presented in Table 8.

Table 8: Redundant fixed effect likelihood ratio

Redundant Fixed Effects Tests			
Equation: Untitled			
Test cross-section fixed effects			
Effects Test	Statistic	d.f.	Prob.
Cross-section F	3.551148	(6,51)	0.0052
Cross-section Chi-square	21.992906	6	0.0012

Source: Author's computation using Eviews 9

Table 8 gives the result of the redundant fixed effects test used to choose between the limited effect model and the pooled OLS. With a probability of 0.0052, which is less than the 5 per cent critical value, the null hypothesis of the pooled OLS is rejected. Therefore, the fixed-effect model is the most appropriate model for the data.

4.8 Discussion of findings and study implications

The researchers set out to establish a significant relationship between the determinants of reinsurance and the ratio of ceded reinsurance of select life companies in Nigeria. From the results of the fixed effect panel data analysis, it could be observed that contrary to the researchers' expectations, all the explanatory variables have positive relationships with the ratio of ceded reinsurance (RCR). Underwriting risk (UR) with a p-value of 0.152 has an insignificant relationship with RCR. This finding is similar to Kader, Adams and Mouratids (2010) and Workie (2018), who found that insurers with higher underwriting risk used more reinsurance. In agreement with the apriori expectation, a positive relationship was expected between leverage and the demand for reinsurance. This find is consistent with the works of Graven and Tennant (2003), Cole and McCullough (2006), Garneiro and Sherris (2009) and Workie (2018), whose works have provided strong evidence of a positive and significant relationship between financial leverage and the demand for reinsurance. This is because influence measures the extent to which an insurer uses debt to finance its assets. Higher leverage implies a higher risk of insolvency. As a life

insurer faces diverse types of risk, such as mortality and morbidity risk, lapse or surrender risk, investment risk and credit risk, life insurers with higher leverage have fewer funds to absorb their financial and operational losses arising from these risks. Hence, their demand for reinsurance would naturally increase with an increase in leverage. For high-leveraged insurers, reinsurance reduces the strain on the insurer's capital.

A significant and positive relationship was observed between firm size and ceded reinsurance. Therefore, Nigeria's null hypothesis of no meaningful relationship between firm size and ceded reinsurance of life insurance companies is rejected. The positive relationship obtained in the result contradicts the apriori expectation of a negative relationship. Workie (2018) opines that the size of an insurance company could be a reflection of its strength and ability to reduce expected bankruptcy costs. A large firm size implies a large number of units exposed to risk, which is capable of reducing the deviation of actual losses from expected losses. Lee and Lee (2012) assert that a negative linkage between firm size and demand for reinsurance is expected as larger firms have more resources, better risk diversification systems, complex information systems and improved management of expenses. All these tend to reduce their need for reinsurance. Larger insurance firms can better manage their risk and reduce the probability of bankruptcy. A large number of exposed units enables the law of large numbers to play itself out. This would imply that the larger the firm, the lesser the demand for reinsurance. However, with the positive relationship results observed in the fixed effect regression, the finding seems to go against the popular theory. Mayers and Smith (1990) and Graven and Tennant (2003) explain that such discrepancies may be due to unobserved factors such as the tax status of the companies, cash flow volatilities and within-line policy heterogeneity.

Reinsurance price (RP) has a positive and insignificant relationship with the ratio of ceded reinsurance, contrary to the apriori expectation of a negative relationship. The positive relationship is consistent with the works of Cummins et al. (2008) and Marijana et al. (2014). They maintain that sometimes insurers may be willing to pay high prices to purchase reinsurance to reduce underwriting risks. The p-value of 0.1818, insignificant at the 95 per cent confidence interval, leads to a failure to reject the null hypothesis. Thus it is concluded that there is little relationship between reinsurance price and ceded reinsurance in life insurance companies in Nigeria.

Return on assets has a positive and significant relationship with the ratio of ceded reinsurance. This leads to rejecting the null hypothesis of no meaningful relationship between the variables. Therefore, it is concluded that there is a significant relationship between return on assets and ceded reinsurance of life insurance companies in Nigeria. This corroborates with Aduloju and Ajemunigbohun (2017), who also found a significantly positive relationship between ceded reinsurance and the return on assets of insurance companies in Nigeria. In addition, Kramaric and Galetic (2013) came to the same conclusion

in their study of the influence of reinsurance on the profitability of insurance companies in Austria, where higher levels of profitability were recorded with increased reinsurance premiums.

A summary of the expected and actual results, together with the hypotheses derived from the study, is presented in Table 9.

Table 9: Summary of Results

Independent variable	Expected relationship with RCR	Actual result	p-value	Statistical significance	Hypothesis status
Underwriting risk (UR)	Positive	Positive	0.1524	Insignificant	Hypothesis accepted
Leverage (LVG)	Positive	Positive	0.0394	Significant	Hypothesis rejected
Firm size (FS)	Negative	Positive	0.0402	Significant	Hypothesis rejected
Reinsurance price (RP)	Negative	Positive	0.1818	Insignificant	Hypothesis accepted
Return on assets (ROA)	Negative	Positive	0.0070	Significant	Hypothesis rejected

Source: Author’s composition from the analysis

This study has implications for the Nigerian insurance industry. The positive relationship between underwriting risk and ceded reinsurance has shown that insurers with greater underwriting risk are more likely to purchase reinsurance. This is consistent with the risk-bearing hypothesis that insurers with high underwriting risk are more likely to reinsure than those with less risk to hedge against operational risk (Lee and Lee, 2012). This premise, however, is insignificant with life insurance companies in Nigeria. On leverage, there is evidence that companies with higher financial power also take better advantage of reinsurance protection by purchasing more reinsurance cover. ROA plays a significant role in the decision to cede by life insurers, indicating that life insurers that make more profits tend to cede more risks to reinsurers. This study implies that the management decision of life insurers regarding the purchase of reinsurance is complex and varies unevenly across lines of underwriting risk, leverage, firm size, reinsurance price and return on assets. This study has provided new insight into the factors influencing the demand for reinsurance by core life insurance companies in Nigeria. As one of the few studies on the subject, it has provided a good foundation for future research.

5. CONCLUSION

This study revealed factors determining the purchase of reinsurance by life insurance companies in Nigeria. Five factors were considered and tested: underwriting risk, leverage, firm size, reinsurance price and return on assets. It was discovered that, in line with the proposed hypotheses, underwriting risk and reinsurance price had insignificant relationships with the ratio of ceded reinsurance. On the other hand, leverage, firm size and asset return had significant associations with ceded reinsurance.

It was also discovered that, consistent with the apriori expectation, there is a positive relationship between underwriting risk and ceded reinsurance and between leverage and ceded reinsurance. However, contrary to expectation, a positive relationship exists between firm size and ceded reinsurance, reinsurance price and ceded reinsurance, and between return on assets and ceded reinsurance. Certain discrepancies in the actual results from the expected results may be attributed to measurement error or unobserved factors such as tax status, cash flow volatilities of the companies and within-line policy heterogeneity. These pose limitations to the study, which may be considered in further research. As Soye and Adeyemo (2017) suggested, insurance companies in Nigeria should prioritize reinsurance with special consideration to their firm size, underwriting risk, leverage and return on assets. This will ensure optimum retention levels, which would aid risk diversification and promote the favourable performance of the firm.

5.1 Recommendations

- a) Life insurance companies should seek to increase their firm size and asset returns. As these factors positively affect reinsurance, the premium spent on reinsurance would be justified.
- b) Since reinsurance can be used as a buffer with highly-leveraged companies, policymakers and regulators should monitor and enforce appropriate reinsurance levels to aid these companies.
- c) Regulations should be made geared towards boosting the demand for reinsurance protection.
- d) There is a need for additional theoretical research to discover factors other than those mentioned in the study, which make up for the remaining 36.24 per cent determinants of ceded reinsurance not represented in the survey. This would provide a solid base for future empirical studies.

5.2 Further study

For further study, more firm-specific factors such as product diversification and taxes could be substituted to obtain a broader view on the subject. Industry-specific effects may also be considered to create a more balanced view. Similar research could be carried out for the non-life insurance sector or the entire insurance industry.

REFERENCES

- Abass, O. and Obalola, M. (2018), "Reinsurance utilization and performance of the non-life business in the Nigerian insurance industry", *The Journal of Risk Management and Insurance*, Vol. 22 No. 9, pp.18-30.
- Aduloju, S. and Ajemunigbohun, S. (2017). "Reinsurance and the performance of the ceding companies: the Nigerian insurance industry experience". *Journal of Economics and Business*, Vol. 31 pp.19-29.
- African Alliance Financial Report various years. Retrieved from <https://africanallianceplc.com/download/financials.pdf>
- Akande, A., Samuel, S. and Iyodo, B. (2020), "Recapitalization and the financial performance of firms: empirical evidence from the insurance industry in Nigeria". *European Journal of Business and Management*. Vol.12 No.23, pp.59-68
- Brooks, C. (2008), *Introductory Econometrics for Finance*, 2nd ed. Cambridge University Press, New York.
- Capital Exchange Financial Report. Retrieved from https://www.capitalexpressassurance.com/financial_reports/CapitalExpressAnnualReport.pdf
- Cole, C. and McCullough, K. (2006), "A reexamination of the corporate demand for reinsurance", *Journal of Risk and Insurance*, Vol.73 No.1, pp.169-192.
- Creswell, J. (2009), *Qualitative, quantitative and mixed methods approaches*, 3rd ed. SAGE Publication Inc, USA.
- Cummins, J., Dionne, G., Gagne, R., and Noura, A. (2021), "The costs and benefits of reinsurance", Forthcoming in *Geneva Papers on Risk and Insurance – Issues and Practice*.
- FBN Insurance Annual Report. Retrieved from <https://www.fbninsurance.com/wp-content/uploads/2019/04/FBNInsurance-Annual-Report.pdf>
- Garneiro, L. and Sherris, M. (2009), "Demand for reinsurance: evidence from Australian insurers", *China-USA Business Review*, Vol.8 No.10, pp1-21.
- Garven, J. and Tennant, J. (2003), "The demand for reinsurance: theory and empirical tests", *Assurances*, Vol.7 No.3, pp.217-238.
- Harrington, S. and Niehaus, G. (2000), volatility and underwriting cycles. In: G. Dionne, (Ed.), *Handbook of Insurance*. Kluwer Academic Publishers, Boston 657-686
- Holland, D. (2009) "A brief history of reinsurance", special edition. *Reinsurance News*, Vol.65, pp.4-34
- Hsiao, C. (1985), "Benefits and limitations of panel data", *Econometric Reviews*, Vol.4 No.1, pp.121-174.
- Iqbal, H. and Rehman, M. (2014), "Empirical analysis of reinsurance utilization and dependence with respect to its impact on the performance of domestic non-life stock insurance companies operating in the private sector of Pakistan", *International Journal of Finance and Services Management*, Vol.7 No.2, pp.95-112.
- James, R. and Joan, L. (2003), "The demand for reinsurance: theory and empirical tests", *Insurance and Risk Management*, Vol.7 No.3, pp.217-237
- Kader, H., Adams, M. and Mouratidis, K. (2010), "Testing for trade-offs in the reinsurance decision of UK life insurance firms", *Journal of Accounting, Auditing and Finance*, pp.493-522.
- Kramaric, P., and Galetic, F. (2013), "The influence of reinsurance on insurance companies' profitability: evidence from the Austrian, Croatian and Romanian insurance industry", *Journal of Applied Finance and Banking*, Vol.3 No.6, pp.115-121.
- Lee, H. and Lee, C. (2012), "An analysis of reinsurance and firm performance: evidence from the Taiwan property-liability insurance industry", *The Geneva Papers on Risk and Insurance-Issues and Practice*, Vol.37 No.3, pp.467-484.
- Lei, Y. and Schmit, J. (2010), "Factors influencing the demand for reinsurance in the medical malpractice insurance market: a focus on organizational form", *Journal of Insurance Regulation*, Vol.29, pp.1-28.
- Marijana, C., Maja, P., and Kramaric, P. (2014), "Factors influencing demand for reinsurance", *The 8th International Days of Statistics and Economics*, Prague, pp.297-307.
- Mayers, D., and Smith, C. (1990), "On the corporate demand for insurance: evidence from the reinsurance market", *Journal of Business*, Vol.63 No.1, pp.19-40.

- Mojekwu, J. and Ibekwe, U. (2015). "Socio-economic indicators affecting life insurance business in Nigeria". *Journal of Emerging Trends in Economics and Management Sciences*, Vol.61, pp.340-344.
- Mutual Benefit Insurance Annual Report. Retrieved from https://www.mutualng.com/assets/docs/plc-investors/2019/Mutual_Benefit_Assurance_2019_Annual_Report.pdf
- National Insurance Commission NAICOM (2019a). Insurance companies transacting life business in Nigeria. Retrieved from <https://naicom.gov.ng/index.php/insurance-industry/insurance-companies2/life>.
- National Insurance Commission NAICOM (2019b). Insurance market performance. Market Statistical Publication. Available at <https://www.naicom.gov.ng/docs/publications/Market%20Statistical%20Publication%20-%202019.pdf>
- Nigeria Insurance Digest. Retrieved from <https://www.nigeriainsurers.org/downloads>
- Obalola, M. and Abass, O. (2016), "Demand for reinsurance and solvency of insurance business in Nigeria: an empirical analysis" *UNILAG Journal of Humanities*, Vol.4 No.1, pp.63-79.
- Ogege, S. and Mojekwu, J. (2013), "An empirical analysis of the determinants of capital adequacy in the insurance sub-sector of the Nigerian economy". *UNILAG Journal of Humanities*. Vol.1 No.1, pp.11-21
- Outreville, F. (1998), *Theory and Practice of Insurance*, McGraw-Hill, New York: DOI: 10.1007/978-1-4615-6187-3_14
- Park, H. (2020), "An empirical study on the reinsurance decisions of Korean life insurance companies", Unpublished thesis of the KDI school of public policy and management.
- Plantin, G. (2006), "Does reinsurance need reinsurers?", *Journal of Risk and Insurance*, Vol.73, pp.153-168
- Powell, L. and Sommer, D. (2007), "Internal versus external capital markets in the insurance industry: the role of reinsurance", *Journal of Financial Service Research*, Vol.31, pp.173-188.
- Royal Exchange Annual Report. Retrieved from <https://www.royalexchangeplc.com/wp-content/uploads/2019/12/Royal-Exchange-Annual-Report-2012.pdf>
- Soye, Y. and Adeyemo, D. (2017), "Evaluation of impact or reinsurance mechanism on insurance companies' sustainability in Nigeria". *International Journal of Research, Innovations and Sustainable Development*, Vol.7 No.1, pp.177-190
- Sharma, S. (2019), *Experimental and Ex Post Facto Design*. Horizons University Press, Paris.
- Standard Alliance Insurance Annual Report. Retrieved from <http://www.sainsuranceng.com/wp-content/uploads/2021/07/saiplcfsACCOUNTS.pdf>
- Tang, K., and Weng, C. (2012), "Enhancing insurer value using reinsurance and value-at-risk criterion", *The Geneva Risk and Insurance Review*, Vol.37, pp.109-140.
- Tongco, D. (2007), "Purposive sampling as a tool for informant selection", *Ethnobotany Research and Applications*, Vol.2 No.4, pp.147-158.
- Wehrhahn, R. (2009), *Introduction to Reinsurance*. Primer Series on Insurance. The World Bank, 1-38
- Weiss, M. (2007), "Underwriting cycles: a synthesis and further directions", *Journal of Insurance*, Vol.30, pp.31-45.
- Workie, T. (2018), "Factors influencing demand for reinsurance in Ethiopian insurance companies", A Thesis submitted to the Department of Accounting and Finance, College of Business and Economics, Addis Ababa University.
- Zenith life Assurance Company Ltd Annual Report. Retrieved from <https://prudentialzenith.com/wp-content/uploads/2020/10/ZLAC-FS.pdf>