

**Does Risk Appetite influence Demand for Reinsurance? A survey of the
Evidence**

By

DANSU, Sewhenu Francis

**Department of Insurance
Faculty of Management Sciences
Lagos State University, Ojo
+2348029506678
(francisdansu@gmail.com)**

&

ABASS, Olufemi Adebowale

**Department of Insurance
Faculty of Management Sciences
Lagos State University, Ojo
+2348023916630
(lollyphem@gmail.com)**

Abstract

Reinsurance appears to be a very useful tool for primary insurers to secure themselves risks of decline performance. Nevertheless, over reliance on it can be detrimental to financial performance and shareholder's value. This notwithstanding, risk appetite seems to be a major determinant of the demand of reinsurance. This study aimed at assessing the influence of risk appetite on the demand for reinsurance in the non-life insurance sector of Nigeria. The research is descriptive in nature and it relied on secondary data of eleven non-life insurance companies from 2008-2017 as contained in NIA Digest, the publication of the Nigeria Insurers Association (NIA). Relationship between the variables is tested with regression and correlation analyses. Results shows that risk appetite significantly influence the demand of reinsurance in the non-life insurance sector. Although, solvency did not demonstrate any significant relationship with demand for reinsurance but capital adequacy, appears to be positive and significant in its relationship with demand for reinsurance. The researchers therefore recommend that alternative strategies that can help non-life insurers secure capital required to meet short-term financial obligations should be considered. Also, non-life insurers should always keep an eye on their capital if they have no capacity to raise it beyond the benchmark imposed by the regulator.

Keywords: Capital Adequacy, Non-Life Insurer, Reinsurance, Risk Appetite, Solvency

Introduction

Reinsurance appears to be a reliable tool for the management of risks acquired by primary insurance firms (Swiss Re, 2002 as cited in Iqbal & Rehman, 2014b). It does not only guarantee performance of the risk indemnification function of primary insurers, it also secures the continuity of business and makes shareholders' return possible. Dansu and Obalola (2018) posited that reinsurance mechanism is essentially embraced by primary insurers to achieve financial stability. Apart from helping primary insurers to stabilise their underwriting results, reinsurance provides them with expertise in core insurance business areas, offers relieve in cases of capital shock and encourages efficiency in risk and capital management (Swiss Re, 2004).

A stable and functional insurance industry depends majorly on the strength of available reinsurance facility (Burca & Batrinca, 2014). This is because reinsurance provides the platform to assume risks that ceding companies (or primary insurers) cannot accommodate considering their current operational capacity. With the reinsurance device, ceding companies can expand their underwriting capacity to accept more risks from corporate bodies and individuals. As pleasant as this seems, insurance companies needs to exercise some restraint in their effort to utilise the reinsurance option. As chronicled by Abass (2019), reinsurance can negatively affect insurance company's performance by increasing business expenses, reducing efficiency and deterring profitability.

Insurance firms are primarily established to manage the risks capable of hindering others from achieving targets (Kokobe & Gemechu, 2016). They effectively utilise their expertise to provide compensation for financial losses. In performing this role, insurers accumulate risks from different sources but in doing this; maintain a limit with regards to their risk-taking ability. It therefore behoves on them to be strategic and rational in taking decisions about the kind of risks to accept and the volume to accommodate (Epetimehin, 2013).

The amount of risks a company is prepared to accept and will still achieve its strategic objectives represents its risk appetite. As succinctly put by Epetimehin (2013) risk appetite is central to every managerial decision as it describes the relationship between a firm's value and the size of risks it is willing to take. To an insurer, risk appetite represents a very important element of its risk management framework. Indeed, it is at the core of insurance business since their success depends on their ability to decide on the best combination of risks they will accept in their portfolio (Atlas Magazine, 2018).Risk appetite helps the insurer

to describe the types and level of risks it can comfortably assume. Standard and Poor (2010) as cited by Risk Appetite Literature Review (2016) described risk appetite as risks that an insurer is willing to acquire, avoid, retain and remove in order to achieve its strategic goals.

There seems not to be limit to the amount of risks, ceding companies can accept in their portfolios particularly with the availability of reinsurance facilities. Nevertheless, this needs to be done with a lot of care. Empirical evidences had shown that over dependence on reinsurance can be detrimental to the performance of insurance firms (Abass & Obalola, 2018; Iqbal & Rehman, 2014a). However, primary insurers can smoothen the imbalance by adhering to their risk appetite framework since risk appetite has the capacity to guide insurers on the volume of risks they can cede. This suggests that risk appetite may likely be a crucial determinant of reinsurance demand by primary insurers. This proposition has been alluded to by Orros, Badal, Burke, Byrne, Chacko, Garner, Kaye and Noel (2011) that risk appetite should dictate the limit of the measure and cost of reinsurance outwards of an insurer.

Empirical and theoretical studies linking risk appetite and demand for reinsurance seem not to have a pronounced presence in the literature. Shang and Chen (2012) decried this paucity their review that they “*cannot find any academic papers that have in-depth discussion of risk appetite*”. Some related studies with focus on factors affecting demand for reinsurance, reinsurance and insurance companies’ performance and Enterprise Risk Management (ERM) in insurance firms, are conducted outside the Nigerian setting (Blazhevski, 2016; Burca & Batrinca, 2014; Iqbal & Rehman, 2014a; Carneiro & Sherris, 2009). These are in addition to few conceptual analyses in the area of risk appetite of insurance firms by rating agencies and consultants (Shang & Chen, 2012; Dowd, Bartlett, Chaplin, Kelliher & O’Brien, 2007; Bennet & Cusick, 2007). The seeming dearth in scientific evidences tends to further stimulate the need for this research.

The focus of this study is to examine the influence of risk appetite on the demand for reinsurance in the non-life insurance sector of Nigeria. It shall attempt to observe the relationship between the determinants of the two variables of the study. To achieve this objective, the research conjectures that measures of risk appetite will not significantly influence demand for reinsurance among non-life insurance firms in Nigeria. The remaining part of this paper focuses on the review of relevant literatures, methodology, data analysis, findings and discussion, recommendation, and conclusion.

Literature Review

The quest for ERM implementation in corporate organisations necessitates some clearly defined risk criteria, one of which is risk appetite. As well observed by Blazhevski (2016), risk appetite constitutes an essential component of the ERM framework. Bennet and Cusick (2007) added that an ERM plan will remain fragile without a visible risk appetite structure in place. The concept of risk appetite seems to be relatively new to academic debate. As mentioned in the Risk Appetite Literature Review (2016), risk appetite discuss began to gain prominence in 2006. More precisely, its presence became glaring after the last global financial crisis (Koob, Basman, Britt, Cohen, Cooper, Ferreira, Tartarow & White, 2016).

Several efforts have been devoted to suggest an all-embracing definition for risk appetite but as noted by Orros, et al. (2011), scholars are yet to agree on a universally acceptable definition. However, one common feature of the available definitions of risk appetite is that it is geared towards the creation of organisational value. According to Koob et al. (2016), risk appetite can be defined as the total volume and types of risks that an entity is willing to accept or reject within its risk capacity and will still achieve its strategic business goals and plans. In a related view, Bennet and Cusick (2007) opined that risk appetite represents the value of risks an organisation intends to undertake in consonance with its strategy. It can be viewed as the maximum amount of risks a firm wishes to bear without confronting any difficulty in obtaining its expected earnings (Epetimehin, 2013).

Setting up the risk appetite is a fundamental aspect of the ERM implementation and the role seems to be reserved for the board of directors. In this regard, Blazhevski (2016) tasked board of directors of insurance firms to support the ERM programme and show responsibility by approving and reviewing the firm's risk appetite statement. This according to Bennet and Cusick (2007) must be considered and performed under Objective Setting, the first stage of the ERM process. An insurance company stands to benefit immensely from clarifying its risk appetite. Apart from simplifying business decisions and increasing the chances of achieving strategic objectives, it also lower cost of capital and reduces regulatory monitoring (Risk Appetite Literature Review, 2016).

Despite the huge importance attached to determining risk appetite, studies have shown that most business entities do not set up their appetite for risk. Dowd et al. (2007) reported that 50% of insurance firms failed to specify their risk appetite while those that did based it on subjective terms. This made the authors to conclude that insurance companies appears to be

weak in their application of ERM when compare to banks and firms operating in the capital market. This finding was affirmed by a study carried out among insurance firms in Macedonia by Blazhevski (2016). The results of this research indicated that majority of insurers could not show their statement of risk appetite as approved by their board of directors.

Insurance firms need to constantly manage their risks in a manner that will keep the risk appetite at a level that maximizes profitability and shareholders' value (Veprauskaite & Sherris, 2014). Articulating risk appetite of financial institutions like insurance firms takes cognisance of certain quantitative and qualitative variables (Shang & Chen, 2012; Orros, et al., 2011). While capital, liquidity, solvency and earnings are listed among the quantitative dimensions, operational controls, reputational impacts, regulatory breaches and governance process are noted as qualitative measures (Orros, et al., 2011).

In line with the quantitative measures of risk appetite, this study shall engaged capital adequacy and solvency as proxies for risk appetite. Solvency and capital adequacy of insurance firms are essential measures of their ability to take on risks in the industry. While solvency refers to the excess of assets over liabilities or the ability to meet up with debt obligations, Capital adequacy is the minimum statutory reserve of capital that a financial institution should provide for. Increased solvency and capital of insurance companies are expected to put them at a better position to accept more risks hence, being voracious about their risk appetite. This is because not only will the insurance company prefer to take on higher risk business the associated reinsurance costs will not in any way decimate their capital adequacy and solvency standing.

An insurer with a high-risk appetite is expected to build its capital above the statutory requirement. Notwithstanding the regulatory position on capital adequacy, primary insurers are required to have sufficient capital in order to cope with situations where actual loss experience is worse than the expected (Bates & Atkins, 2007).

As submitted by Bates and Atkins (2007), one important implication of an insurer not having sufficient capital is insolvency. This defect has been linked directly with the insurer's risk appetite decision (Cummins & Philips, 2009). The justification for this is that insurance firms facing solvency challenge are likely to have taken decisions that increase their burden of risks. Therefore, a low solvency ratio will likely increase an insurer's need for reinsurance.

In taking major decisions in insurance business, risk appetite has a lot of role to play. Precisely, Orros et al. (2011) mentioned that risk appetite will guide decision makers in taking both tactical and strategic decisions about reinsurance buying. This is because a high risk appetite is capable of inducing the purchase of reinsurance (Soye & Adeyemo, 2017; Carneiro & Sherris, 2009), or in the long run reduce reinsurance utilisation of ceding companies (Abass & Obalola, 2018).

Reinsurance is commonly referred to as insurance for insurers (Swiss Re, 2004). Cummins, Dionne, Gagne and Nouira (2008) noticed that the same factors that encourage individuals and business entities to seek insurance also prompt insurers to purchase reinsurance. Theoretically, reinsurance is simply the transfer of liability from the primary insurer to another insurer. Broadly, it means the transfer of risks from one insurer (Primary Insurer or Cedant) to another insurer (the Reinsurer) through an agreement under which the reinsurer agrees, in return for a reinsurance premium to indemnify the cedant for some or all of the financial consequences of certain loss exposures covered by the primary insurer's policy (Iqbal & Rehman, 2014a). It also be viewed as an insurance contract issued by one party (the Reinsurer) to compensate another party (the Primary Insurer or Ceding Company) for claims arising from one or more insurance contracts (underlying contracts) issued by the later (IFRS 17 as cited in Mohamed, 2019).

Sognon (2018) observed that reinsurance is applied by the primary insurer to maximise returns on its underwriting activities. It serves as a risk management instrument available to primary insurers to guarantee a functional and stable insurance market. According to Burca and Batrinca (2014) reinsurance seems to remain the most suitable means of stabilizing the results of insurance firms. It helps insurance companies with the requisite techniques for their operation, stabilises their portfolios and prevents them from capital depletion (Dansu & Obalola, 2018).

A number factors determine the choice of reinsurance arrangement. This forms the core of the findings of a study by Veprauskaite and Sherris (2014) aimed at explaining reinsurance decisions in life insurance companies. Based on data gathered from a large Australian life insurer, the results found risk retention levels, premiums and sum insured values as the major determinants of reinsurance arrangements. The research proposed a combination of reinsurance arrangements for insurance companies with multiple portfolios. In the context of

the Romanian insurance market, Burca and Batrica (2014) investigated the factors that determined the demand for reinsurance. Relying on the secondary data obtained from 2008 to 2012, the study revealed return on total assets ratio, company size, age of the company and financial leverage as the major determinants of reinsurance demand.

The demand for reinsurance by insurers is motivated by the need for effective risk management, effort to strengthen underwriting capacity, quest to remain viable in the midst of competition and the obligation to comply with regulation (Sognon, 2018). However, research findings in recent times seem to differ with respect to the extent to which reinsurance has been able to fulfill the aforementioned expectations. This is because reinsurance combines the ability to exert either positive or negative effects on the performance of primary insurers. Burca and Batrica (2014) posited that while reinsurance possesses the capacity to decrease uncertainty of loss rate, it also has the potential of increasing the expenses of the primary insurer. This assertion seems to tally with the Nigerian experience as it is in line with the outcome of a study carried out in the Nigerian non-life insurance sector by Abass and Obalola (2018). The study which engaged mixed method to investigate the link between reinsurance utilisation and performance revealed the existence of a strong and positive relationship between the variables of the study. The results however exposes the over reliance of Nigerian non-life insurers on reinsurance which consequently reduces their performance. A confirmatory check with a similar research by Abass (2019) affirms the outcome of the earlier study.

In the context of Pakistan, Iqbal and Rehman (2014a) applied panel data obtained over a ten year period (2002-2011) to examine the influence of reinsurance utilisation, dependence and exposure of reinsurance on performance (loss ratio, expense ratio and firm size) of non-life insurance firms. The study found a positive contribution of reinsurance utilisation to performance but a negative contribution of both reinsurance dependence and its exposure to performance. A similar attempt was made by Iqbal and Rehman (2014b) but with a different set of performance indicators (Return on Assets and Return on Equity). This study show results that were similar to that of the previous study.

In a slight contrast to the outcome of the above researches, Dansu and Obalola (2018) in their study to investigate the effect of reinsurance on the financial performance among Nigerian non-life insurance firms found that purchase of reinsurance activities only exerts positive and

significant effect on performance. This result was similar to the findings of Aduloju and Ajemunigbohun (2017) whose study suggested the existence of a positive relationship between reinsurance and performance of insurance firms in Nigeria. Same as Sognon (2018), whose study was in the South African perspective.

Reinsurance and its demand have been subjected to empirical analysis in recent times. Drawing insight from these researches, this study shall adopt Ratio of Ceded Reinsurance (RCR) and Reinsurance Dependence Ceded Premium (RDCP) as indicators for the demand for reinsurance. RCR describes the extent to which reinsurance is utilised by an insurance company to meet up with the expectations of policyholders (Dansu & Obalola, 2018). This measure was used previously by (Iqbal & Rehman, 2014a&b) and (Dansu & Obalola, 2018) in their studies to indicate reinsurance utilisation. RDCP measures the rate of insurance company's dependence on its reinsurers to settle claims and the rate of the insurer's exposure to failure of the reinsurer to deliver (Abass, 2019). RDCP was engaged by (Abass & Obalola, 2018) and (Abass, 2019) to measure reinsurance dependence.

Country-level factors have both economic and statistical significant effects on the demand for reinsurance. This is the outcome of a global research by Altuntas, Garven and Rauch (2015) to investigate the degree to which demand for reinsurance by property-liability insurers in different countries differs and are affected by firm-level and country-level factors. Mankai and Belgacem (2016) in their study carried out to analyse the interactions between risk taking, capital and reinsurance among Property-Liability insurers in United State of America had found a positive relationship existing between risk taking and capital but found a negative relationship between reinsurance and capital. According to the authors, this result reflects the complementary role perform by capital and reinsurance.

A study by Powell and Sommer (2005) to analyse the differences involve in demanding reinsurance service from reinsurance pool or from professional reinsurers has revealed the existence of some structural and cost-based differences in the two options. In another study, Culp and O'Donnell (2009) reported a significant difference between the costs and benefits of available internal and external sources of risk capital to property and casualty insurance firms in the United Kingdom. The paper which was aimed at reviewing similarities and differences between various risk capitals employed by insurers also suggested that insurers should begin

to focus more on the mix of internal and external sources of risk capital to acquire instead of directing their attention on how much reinsurance to purchase.

Abass and Ojikutu (2019) carried out a study in the Nigerian non-life insurance sector to examine the correlation between capital and demand for reinsurance. Adopting longitudinal descriptive research design, the authors found that demand for reinsurance by primary insurers is significantly dependent on sufficiency of capital. In Pakistan, Sheik, Syed and Shah (2018) investigated the link between corporate reinsurance utilisation and capital structure among life and non-life insurance firms. The study which covers six life and twenty-seven non-life insurers for a period of ten years revealed that solvency risk, underwriting risk, firm performance, rate of interest and business mix significantly affect the demand for reinsurance. The authors also reported that life insurance firms embrace reinsurance more than non-life firms.

In a US based study which focus is to evaluate capital adequacy and risk-based capital systems, Cummins and Philips (2009) reported that the risk-based capital systems is not an accurate predictor of insurer insolvencies. The author therefore recommended that the system should be upgraded to current international standards. In the Ukraine insurance industry, Pukala, Vnukova, Achkasova and Smoliak (2017) conducted their study to develop a scale for the assessment of capital adequacy as a measure of controlling reinsurance default risk. The study which engaged 50 insurance firms relied on data obtained in 2015 and 2016 and submitted an improved scale to assess capital adequacy as a control measure for reinsurance default risk.

Solvency appears to be significantly related to the demand for reinsurance. This is the conclusion of Obalola and Abass (2016) in their study carried out to investigate if excessive reinsurance purchase is an indication of insolvency of Nigerian insurance companies. Based on data obtained from ten non-life insurers, the authors found solvency of primary insurers to be a significant determinant for the demand for reinsurance. This result corroborates the findings of an earlier research in the U. S. context to examine the effect of ceded reinsurance on solvency of primary insurers. The study which was carried out by Chen, Hamwi and Hudson (2001) showed that excessive use of reinsurance is an indication of insurer's insolvency.

Desjardins, Dionne and Kone (2020) analysed the relationship between insurance firms' liquidity and demand for reinsurance. The results indicated that liquidity positively affects reinsurance demand. The authors however observed that large insurers are not likely to purchase more reinsurance because of their capacity to create more liquidity. A related research was conducted in the U.S. by Chang and Jeng (2016) to examine the connectivity between demand for reinsurance, liquidity, and leverage in the property-liability insurance industry. The results revealed that insurers' liquidity and reinsurance demand are substitutes while reinsurance demand and leverage are complementary.

Theoretical Framework

This research considers a combination of Corporate Demand Theory (CDT) and Optimal Reinsurance Theory (ORT) as most appropriate. While CDT was propounded by Mayers and Smith (1990) with contributions from Adiel (1996) and Plantin (2006), the ORT has its roots in the works of Borch (1960) and Arrow (1963). Both theories recognised the benefits of reinsurance purchase but emphasised the need for insurance companies to be cautious on its utilisation since over dependence on reinsurance puts the ceding company in a disadvantage position (Tang & Weng, 2014; Lee & Lee, 2012). According to the proponents of ORT in particular, the cost of reinsurance is dependent on the volume of risks transferred to the reinsurer. Hence an insurer with a low risk appetite will end up incurring more reinsurance cost since he will be left with no other option than to cede more of its risk to reinsurance.

Data and Methodology

The descriptive research design is considered suitable for the nature of this study since the study is an attempt to illustrate the nature of relationship between the variables of the study. The population of the study includes all the 29 non-life insurance firms presently operating in Nigeria. Based on this figure, the study applied the Yamane (1967) formula to determine the sample size.

The formula states that;

$$n = \frac{N}{1+N(e)^2}$$

The maximum margin of error chosen is 5%.

Thus,

$$n = \frac{29}{1 + 29(0.05)^2}$$

$$n = \frac{29}{1.0725}$$

$$n = 27.03$$

In line with the above calculation, 27 companies were expected to represent the sample size. Nevertheless, only eleven companies found to have completed data required for the study were purposively selected.

Secondary data used for the study covered a period of ten years from 2008 to 2017. The data were gathered from the audited annual financial reports of the eleven companies and the NIA Digest (a yearly publication of the Nigeria Insurers Association, NIA). Data extracted were used to derive Capital Adequacy, Solvency, Ratio of Ceded Reinsurance (RCR) and Reinsurance Dependence of Ceded Premium (RDCP) as presented in table 1:

Table 1: Variable chosen for the study

Variables	Formulae
Ratio of Ceded Reinsurance (RCR)	Reinsurance Ceded/ Gross Premium Written
Reinsurance Dependence of Ceded Premium (RCDP)	Ceded Premium/ Total Assets
Capital Adequacy	Insurer's Capital / Assets
Solvency	Net Income of the Insurer /Total Liability

Source: Compiled by the researchers based on earlier studies.

$$Y_i = f(X_i)$$

In this study, the dependent variable is demand for reinsurance, which was indicated by Ratio of Ceded Reinsurance (RCR) and Reinsurance Dependence of Ceded Premium (RCDP).

Y = Demand for Reinsurance

Y = Y₁, Y₂

Therefore,

Demand for Reinsurance = Ratio of Ceded Reinsurance (Y₁), Reinsurance Dependence of Ceded Premium (Y₂).

The independent variable is risk appetite proxy by Capital Adequacy and Solvency.

X = Risk Appetite

X = X₁, X₂

Therefore,

Risk Appetite = Capital Adequacy (X₁), Solvency (X₂).

The model for the study is shown below:

.....

Risk Appetite (RA)

S= Solvency

CA=Capital Adequacy

DR= Demand for Reinsurance

RCR=Ratio of Ceded Reinsurance

RDCP= Reinsurance Dependence of Ceded Premium

α = Intercept

β₁, β₂ = Coefficient for the respective determinant

e= Error term

Model specification

H₀₁: Solvency does not significantly influence the return of reinsurance ceded of insurance companies in Nigeria.

$$RCR = \alpha + \beta_1 S$$

Hypothesis two

H₀₂: There is no significant relationship between capital adequacy and reinsurance dependence in the ceded premium of insurance companies in Nigeria.

$$RDCP = \alpha + \beta_1 CA$$

Hypothesis three

H₀₃: Risk appetite variables do not jointly affect the demand for reinsurance of insurance companies in Nigeria.

$$DR = \alpha + \beta_1 CA + \beta_2 S \text{ (Multiple Regression Analysis)}$$

The collected data were analysed using descriptive (tables and charts) and inferential statistics (correlation analysis, simple and multiple regression analysis). The descriptive statistics explores and presents an overview of all variables used in the analysis. Pearson Product Moment Correlation and Regression analysis were used to measure the relationship between the variables of the study.

Data Presentation Analysis and Interpretation

Result of Descriptive Analysis

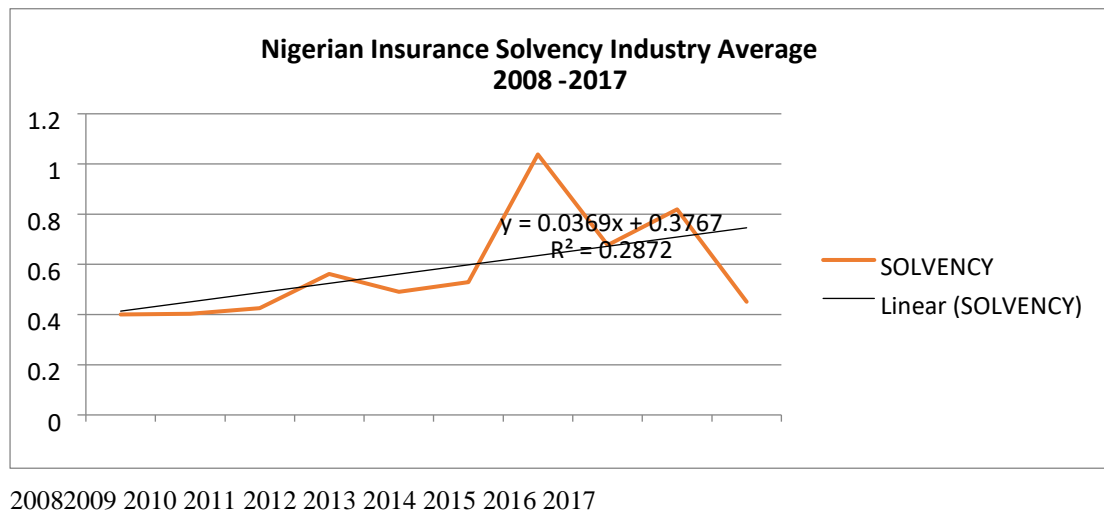


Figure 1: Nigerian Insurance Solvency Industry Average (2008 -2017)

Figure 1 shows the chart of the industrial average of solvency. There has been a steady upward trend in the solvency of the Nigerian Insurance industry from 2008 to 2017.

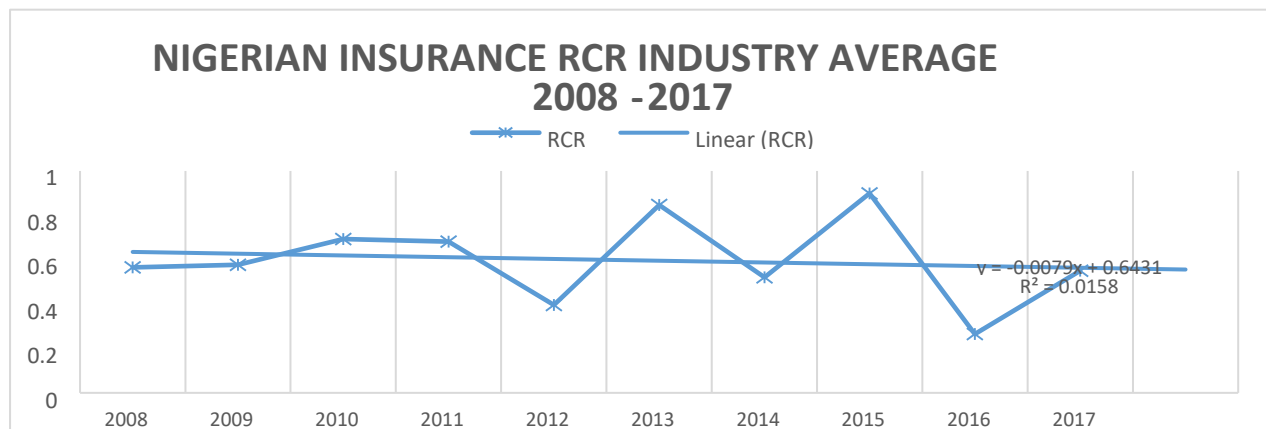
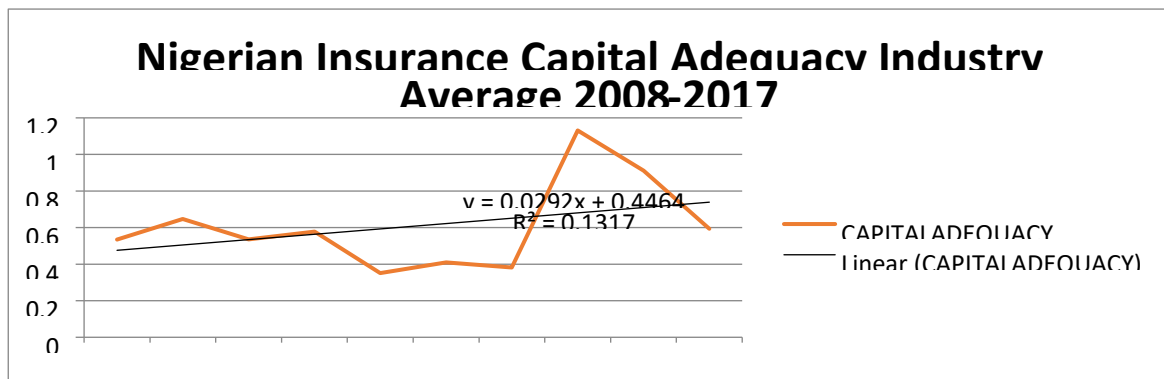


Figure 2: Nigerian Insurance RCR Industry Average (2008 -2017)

Figure 2 shows that there has been a steady downward trend in the RCR of the Nigerian Insurance industry from 2008 to 2017.



2008 2009 2010 2011 2012 2013 2014 2015 2016 2017

Figure 3: Nigerian Insurance Capital Adequacy Industry Average (2008 -2017)

Figure 3 shows the chart of the industrial average of capital adequacy. There has been a steady upward trend in the capital adequacy of the Nigerian Insurance industry from 2008 to 2017.

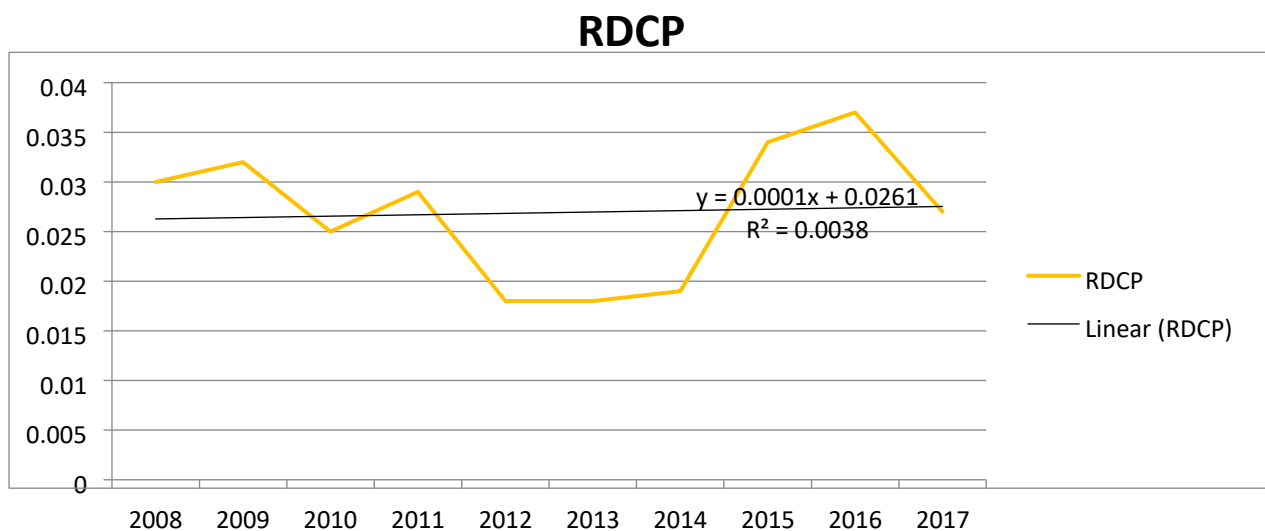


Figure 4: Nigerian Insurance RDPC Industry Average (2008 -2017)

Figure 4 shows that there has been an almost constant stagnant trend in the solvency of the Nigerian Insurance industry from 2008 to 2017.

Diagnostic Treatment Tests for all Variables

Before data is subjected to inferential analysis, diagnostic tests were done to ensure that the data do not violate critical assumptions of regression analysis. These included tests for linearity, normality and stability, heteroscedasticity, and multicollinearity (Greene, 2008; Gujarati, & Sangeetha, 2007).

The results of the normality test of the dependent and independent variables indicated skewness and kurtosis in the range of -1 and +1, as shown in Table 2. This implies that the assumption of normality was satisfied. Therefore, the data was found to be suitable for inferential analysis, in this case, regression analysis.

Table 2: Results of the normality test of the dependent and independent variables

	N	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Solvency	10	.5797	.20843	1.428	.687	1.491	1.334
RCR	10	.5994	.19130	-.064	.687	-.080	1.334
capital adequacy	10	.6072	.24390	1.292	.687	1.352	1.334
RDCP	10	.0269	.00681	-.154	.687	-1.268	1.334

Source: Authors' Computation, 2020

Hypotheses Testing

Regression and correlation analysis were used to test the stated hypotheses at 0.05 level of significance.

Hypothesis one

H₀₁: Solvency does not significantly influence the return of reinsurance ceded of non-life insurance companies in Nigeria.

Regression analysis was used to test this hypothesis.

Independent Variable = Solvency

Dependent Variable = Ratio of ceded reinsurance

Regression analysis

R ²	0.050	n	10
r	-0.225	k	1

	Std. Error	0.198	Dep. Var.	ROR		
ANOVA table		Durbin-Watson= 2.77				
Source	SS	df	MS	F	p-value	
Regression	0.0166	1	0.0166	0.42	.5329	
Residual	0.3128	8	0.0391			
Total	0.3294	9				

Regression output				Collinearity Statistics		
variables	coefficients	std. error	t (df=8)	p-value	Tolerance	VIF
Intercept	0.7189	0.1937	3.712	.0059		
SOLVENCY	-0.2061	0.3162	-0.652	.5329	1.000	1.000

Source: Authors' Computation, 2020

The regression table above shows that there is a negative relationship between solvency and ratio of ceded reinsurance of insurance companies in Nigeria ($r = -0.225$). The coefficient of determination value ($R^2 = 0.050$) signifies that 5% of the variance observed in ratio of ceded reinsurance of non-life insurance companies in Nigeria is explained by solvency. The result is statistically insignificant because the p-value ($p = 0.5329$) generated by the result is higher than the level of significance used for the study (0.05). Furthermore, the model is insignificant because the Fvalue calculated ($F_{1,8} = 0.42$) is less than the tabulated or critical F-value of 5.32. This implies that the ratio of ceded reinsurance of non-life insurance companies in Nigeria cannot be predicted by solvency.

An examination of the coefficient of solvency in the regression output shows that solvency is not significant ($\beta = -0.2062$, $t = -0.652$, $p > 0.05$) in predicting the ratio of ceded reinsurance of non-life insurance companies in Nigeria.

Decision.

The null hypothesis is accepted. This implies that solvency does not significantly influence the ratio of ceded reinsurance of non-life insurance companies in Nigeria.

Hypothesis two

H_{02} : There is no significant relationship between capital adequacy and reinsurance dependence in the ceded premium of non-life insurance companies in Nigeria.

Pearson Product Moment Correlation analysis was used to test this hypothesis

Independent Variable = Capital Adequacy

Dependent Variable = Reinsurance Dependence of Ceded Premium

Table 4. 7: Correlations for Hypothesis two

Correlations

		CAPITAL ADEQUACY	RCDP
CAPITAL ADEQUACY	Pearson Correlation	1	.847**
	Sig. (2-Tailed)		.002
	N	10	10
RCDP	Pearson Correlation	.847**	1
	Sig. (2-Tailed)	.002	
	N	10	10

** . Correlation Is Significant At The 0.05 Level (2-Tailed).

Source: Authors' Computation, 2020

The Pearson Product Moment Correlation analysis table above shows that there is a high positive relationship between capital adequacy and reinsurance dependence in the ceded premium of non-life insurance companies in Nigeria ($r = 0.847$). The relationship is significant because the p-value of the result is less than the level of significance used to the study (0.05).

Decision.

The null hypothesis is not accepted, while the alternative hypothesis is accepted. This implies that there is a significantly high positive relationship between capital adequacy and reinsurance dependence in the ceded premium of non-life insurance companies in Nigeria.

Hypothesis three

H0₃: Risk appetite variables do not jointly affect the demand for reinsurance of non-life insurance companies in Nigeria.

Multiple regression analysis was used to test this hypothesis

Independent Variable, $X_1 = \text{Solvency}$

Independent Variable, $X_2 = \text{capital adequacy}$

Dependent Variable = Demand for reinsurance

Regression analysis

R ²	0.749		
Adjusted R ²	0.677	n	10
r	0.865	k	2
		Dep.	
Std. Error	0.004	Var.	DR

ANOVA table		Durbin-Watson = 2.114			
Source	SS	df	MS	F	p-value
Regression	0.0003	2	0.0002	10.42	.0080
Residual	0.0001	7	0.0000		
Total	0.0004	9			

Regression output				confidence interval			
variables	coefficients	std. error	t (df=7)	p-value	95% lower	95% upper	VIF
Intercept	0.0154	0.0046	3.324	.0127	0.0044	0.0264	
SOLVENCY	-0.0058	0.0063	-0.923	.3866	-0.0206	0.0090	1.026
CAPITAL ADEQUACY	0.0244	0.0054	4.561	.0026	0.0118	0.0371	1.026

The regression table above shows that there is a high positive relationship between risk appetite variables (solvency and capital adequacy) and the demand for reinsurance of non-life insurance companies in Nigeria ($r = 0.865$). The coefficient of determination value ($R^2 = 0.749$) signifies that 74.9% of the variance observed in demand for reinsurance of non-life insurance companies in Nigeria is jointly accounted for or explained by the solvency and capital adequacy. The result is statistically significant because the p-value ($p = 0.008$) generated by the result is less than the level of significance used for the study (0.05).

The model is significant because the F-value calculated ($F_{2,7} = 10.42$) is higher than the tabulated or critical F-value of 4.74. This implies that risk appetite variables which are in this case, solvency and capital adequacy jointly affect the demand for reinsurance by non-life insurance companies in Nigeria significantly.

A critical examination of the coefficients of solvency and capital adequacy in the coefficient table shows that solvency is insignificant ($\beta = -0.0058$, $t = -0.923$, $p > 0.05$) in predicting the demand for reinsurance of insurance companies, while capital adequacy is significant ($\beta = 0.0244$, $t = 4.561$, $p < 0.05$) in predicting the demand for reinsurance of non-life insurance companies. This implies that a unit increase in capital adequacy will increase the demand for reinsurance of non-life insurance companies in Nigeria by 2.4%.

Decision

The null hypothesis is accepted. This implies that risk appetite variables do not jointly affect the demand for reinsurance of insurance companies in Nigeria; instead, only capital adequacy does.

Discussion of Findings

A critical examination of the results of the analysis revealed that solvency does not influence the demand for reinsurance (Ratio of Ceded Reinsurance) by non-life insurers in Nigeria. This implies that reinsurance is not considered as an option for non-life insurance companies to secure their ability fulfil their long-term obligations to policyholders and other creditors. This is likely to be because unlike life insurance firms, most liabilities of non-life insurers are short-term. Moreover, solvency margin for insurers in Nigeria is set by the regulator and once this imposed solvency level has been met, insurers may be cautious as not accept risks not within their capacity.

The results of the correlation analysis which shows that capital adequacy strongly and positively correlates with demand for reinsurance (Reinsurance Dependence in the Ceded Premium) by non-life insurance companies in Nigeria is an indication that the degree to which non-life insurers depend on reinsurance is greatly influenced by the sufficiency in their capital. It therefore implies that an insurer with excess capital will likely not patronise reinsurers as oppose to insurers having insufficient capital. Notwithstanding the fact that the capital base of insurance firms in Nigeria is strictly monitored by the regulator, insurers still

considers the reinsurance facility as a means of securing their capital base so as not to fall short of the minimum benchmark and as a result becomes insolvent.

Further statistical analysis was conducted with multiple regressions to check the joint influence the indicators of the explanatory variable on the two measures of the dependent variable. The results show that risk appetite (Solvency and Capital Adequacy) exerts positive and significant effect on demand for reinsurance by insurance companies in the non-life sector. This explains that non-life insurers with high risk appetite are likely to increase their need for reinsurance and vice-versa. This is expected because high risk appetite means that insurance firms can accept risks far above their retention limit and therefore seek refuge in reinsurance anytime it is deemed necessary. The enormous influence of capital adequacy as reflected in the correlation analysis ($r = 0.847$) tends to dominate the negative effect of solvency on demand for reinsurance in this result. This accounts for the positive relationship found between risk appetite and demand for reinsurance.

These results appear to be consistent with previous findings. For instance, Abass and Ojikutu (2019) had found that demand for reinsurance by primary insurers is significantly dependent on sufficiency of capital. Also, it aligns with the study of Desjardins, Dionne and Kone (2020) that liquidity positively affects reinsurance demand.

This finding however, contradicts the result of Sheik, Syed and Shah (2018) which revealed that solvency risk, underwriting risk, firm performance, rate of interest and business mix significantly affect the demand for reinsurance. It does not also agree with the submission of Obalola and Abass (2016) that solvency of primary insurers is a significant determinant of the demand for reinsurance. The results do not show consistency with Mankai and Belgacem (2016) who found a negative relationship between reinsurance and capital. And also, Chen, Hamwi and Hudson (2001) who reported that excessive use of reinsurance is an indication of insurer's insolvency.

Conclusion and Recommendations

This study was embarked on to assess the influence of risk appetite on the decision of non-life insurance companies in Nigeria to purchase reinsurance. Reinsurance appears to be a very useful tool for primary insurers to secure themselves. However, over reliance on it can be

detrimental to financial performance and creation of shareholder's value. Notwithstanding the direction, risk appetite seems to be a major determinant of the demand of reinsurance.

This study has been able to show evidence of the nature of the relationship between the variables of the study. Specifically, the results indicated that risk appetite significantly dictates the disposition of Nigerian non-life insurers towards the purchase of reinsurance. Although, solvency which is used as one of the pointers for risk appetite did not show any significant relationship with demand for reinsurance, capital adequacy, another indicator of the independent variable, appears to be positive and significant in its relationship with demand for reinsurance.

Considering the outcome of this research, the authors suggest the following recommendations:

1. Non-life insurance companies should consider the usage of cheaper and alternative strategies that can help them to raise capital required to meet their short-term financial obligations. This is necessary to minimise the negative effect that their usage of reinsurance may impose on them. Such alternative strategies can be one or more of diversification, investing in the capital market, adhering to underwriting standards,
2. Also, non-life insurers are advised to ensure that they maintain their minimum share capital at all times, if they do not have the capacity to raise it beyond the benchmark imposed by the regulator. This is because the lower the capital, the higher the need for reinsurance.
3. In addition, irrespective of the level of financial stability being enjoyed by a non-life insurance company, efforts should be made to minimise dependence and exposure to reinsurance since the increased reliance will expose them to potential risk of declined performance.

Reference

- Abass, O. A. & Obalola, M. A. (2018). Reinsurance utilisation and performance of non-life business in the Nigerian insurance industry: A mixed method approach. *The Journal of Risk Management and Insurance*, 22(2), 18-30. Retrieved from: <http://www.jrmi.au.edu>
- Abass, O. A. & Ojikutu, R. K. (2019). Interactions between capital and demand for reinsurance: An empirical study of non-life insurance business in Nigeria. *LASU Journal of Management Sciences*, 5(1), 42-53. Retrieved from: <http://www.researchgate.net>
- Abass, O. A. (2019). Empirical analysis of reinsurance dependence on the profitability of general insurance business in Nigeria. *Academic Journal Economic Studies*, 5(4), 36-43. Available at: <http://creativecommons.org/licenses/by-nc-nd/4.0/>
- Adiel, R. (1996). Reinsurance and the management of regulatory ratios and taxes in the property-casualty insurance industry. *Journal of Accounting and Economics*, 22(1-3), 207-240. Available at: [https://doi.org/10.1016/S0165-4101\(96\)00436-3](https://doi.org/10.1016/S0165-4101(96)00436-3)
- Aduloju, S. A. & Ajemunigbohun, S. S. (2017). Reinsurance and performance of the ceding companies: The Nigerian insurance industry experience. *Journal of Economics and Business*, 31, 19-29. Doi: 10.1515/eb-2017-0015. Retrieved from: <http://www.papers.ssrn.com>
- Altuntas, M., Garven, J., & Rauch, J. (2018). On the corporate demand for insurance: Evidence from the global reinsurance market. *Risk Management and Insurance Review*, 21(2), 211–242. Available at: <https://doi.org/10.1111/rmir.12107>
- Arrow, K. (1963). Uncertainty and the welfare economics of medical care. *The American Economic Review* 53, 941-73.
- Atlas Magazine (2018). Risk appetite in the insurance industry. Published in January, 2018. Retrieved from: <http://www.atlas-mag.net>
- Bates, I. & Atkins, D. (2007). *Management of insurance operations*. London: Global Professional Publishing.
- Bennet, C. & Cusick, K. (2007). *Risk appetite: Practical issues for the global financial services industry*. Prepared for the Institute of Actuaries of Australia Biennial Convention 2007. Retrieved form: <https://www.actuaries.asn.au>
- Blazhevski, D. (2016). Enterprise risk management in Macedonian insurance companies. *Horizons*, 20(17), 23. DOI: [10.20544/HORIZONS.A.20.1.17.P23](https://doi.org/10.20544/HORIZONS.A.20.1.17.P23)
- Borch, K.H. (1960). An attempt to determine the optimum amount of stop-loss reinsurance. *Transactions of the 16th International Congress of Actuaries*, 2, 579-610.
- Burca, A. M. & Batrinca, G. (2014). The determinants of financial performance in the Romanian insurance market. *International Journal of Academic Research in Accounting, Finance and Management Sciences*, 4 (1), 299-308.
- Carneiro, L. A. & Sherris, M. (2005). Demand for reinsurance: Evidence from Australian insurers. *Working Paper*. Available at <http://www.business.unsw.edu.au>
- Chang, V. Y. & Jeng, V. S. (2016). The relationships among the demand for reinsurance, liquidity, and leverage in the U.S. property-liability insurance industry. Taiwan

- Economic Review, 44(4), 543-576. DOI: 10.6277/TER.2016.444.1 Retrieved from: <http://www.econ.ntu.edu.tw>
- Chen, Y., Hamwi, I. S. & Hudson, T. (2001). The effect of ceded reinsurance on solvency of primary insurers. *IAER*, 7(1), 65-82. Available at: <http://www.link.springer.com/article/10.1007%2F02296592>
- Culp, C. & O'Donnell, K. J. (2009). Catastrophe reinsurance and risk capital in the wake of the credit crisis. *The Journal of Risk Finance*, 10(5). 430-459. DOI: [10.2139/ssrn.1443105](https://doi.org/10.2139/ssrn.1443105)
- Cummins, J. D. & Dionne, G., Gagne, R., Nouria, A. (2008). The cost and benefits of reinsurance. *A publication of the Interuniversity Research Centre on Enterprise Networks, Logistics and Transportation (CIRRELT)*. Available at http://www.hec.ca/iea/cahiers/2008/iea0804_rgagne
- Cummins, J. D. & Philips, R. D. (2009). Capital adequacy and insurance risk-based capital systems. *Journal of Insurance Regulation*. Retrieved from: <http://www.researchgate.net>
- Dansu, S. F. & Obalola, M. A. (2018). Reinsurance utilisation and dependence on the financial performance of non-life insurers: Evidence from Nigeria. *Studies and Scientific Researches, Economics Edition*, (28), 48-58. Available at: <http://www.sceco.ub.ro>
- Desjardins, D., Dionne, G. & Kone, N. (2020). Reinsurance demand and liquidity creation: A search for bi-causality. *SSRN Electronic Journal*. Available at: <https://chairegestiondesrisques.hec.ca/wp-content/uploads/2020/06/20-01.pdf>
- Dowd, K., Bartlett, D.L., Chaplin, M., Kelliher, P. & O'Brien, C. (2007). Risk management in the UK insurance industry: The changing state of practice. *International Journal of Financial Services Management*, 3(1), 5-23. DOI: [10.1504/IJFSM.2008.016696](https://doi.org/10.1504/IJFSM.2008.016696)
- Epetimehin, F. M. (2013). Impact of risk appetite on the value of a firm. *European Scientific Journal*, 9(22), 331-344. Retrieved from: <http://www.eujournal.org>
- Iqbal, H. T. & Rehman, M. U. (2014a). Reinsurance analysis with respect to its impact on the performance: Evidence from non-life insurers in Pakistan. *The IEB International Journal of Finance*, 8, 90-113.
- Iqbal, H. T. & Rehman, M. U. (2014b). Empirical analysis of reinsurance utilisation 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 Financial Services Management*, 7(2), 95-112. DOI: [10.1504/IJFSM.2014.063946](https://doi.org/10.1504/IJFSM.2014.063946)
- Kokobe, S. A. & Gemechu, D. (2016). Risk management techniques and financial performance of insurance companies. *International Journal of Accounting Research*, 4(1), 1-5. DOI: [10.4172/2472-114X.1000127](https://doi.org/10.4172/2472-114X.1000127)
- Koob, D., Basman, J., Britt, S., Cohen, A., Cooper, B., Ferreira, D., Tartarow, A. & White, A. (2016). *Developing the risk appetite framework of a general insurance business*. Prepared for the Institute of Actuaries of Australia. Retrieved from: <https://www.actuaries.asn.au>
- Lee, H. H., & Lee, C. Y. (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*, 37 (3), 467-484. Available at: <http://www.springer.com/finance/journal/41288/PS2>
- Mankai, S. & Belgacem, A. (2015). Interactions between risk taking, capital, and reinsurance for property-liability insurance firms. *Journal of Risk and Insurance*, 83(4). Available at: <https://doi.org/10.1111/jori.12080>
- Mayers, D. & Smith, C.W. (1990). On the corporate demand for insurance: evidence from the reinsurance market. *The Journal of Business*, 63(1), 19–40. Available at: <http://dx.doi.org/10.1086/296481>
- Mohamed, H. (2019). The effect of reinsurance operations on the financial performance of non-life insurance companies in the Egyptian market – A quantitative study. *SSRN Online Journal*. Available at SSRN: <http://dx.doi.org/10.2139/ssrn.3490874>
- Obalola, M. A. & Abass, O. A. (2016). Demand for reinsurance and solvency of insurance business in Nigeria: An empirical analysis. *Unilag Journal of Humanities*, 4(1), 1-15. Retrieved from: <http://www.ir.unilag.edu.ng>
- Orros, G., Badal, V., Burke, M. Byrne, M., Chacko, F., Garner, M., Kaye, P. & Noel, D. (2011) *Risk appetite working Party (GIRO); Risk appetite for general insurance undertaking*. Retrieved from: <https://www.actuaries.org.uk>
- Plantin, G. (2006). Does reinsurance need reinsurers? *The Journal of Risk and Insurance*, 73(1), 153–168. Retrieved from: <http://www.gplantin.net>
- Powell, L. S. & Sommer, D. W. (2005). Internal versus external capital markets in the insurance industry: The role of insurance. *Journal of Financial Services Research*, 31(2), 173-188). Available at: <http://dx.doi.org/10.2139/ssrn.664626>
- Pukala, R., Vnukova, N., Achkasova, S. & Smoliak, V. (2017). Improvement of the methodology for assessing the capital adequacy to cover the reinsurance default risk. *Economic Annals-XXI*, 165(5-6), 152-156. DOI: [10.21003/ea.V165-30](https://doi.org/10.21003/ea.V165-30) Retrieved from: <http://www.soskin.info>
- Risk Appetite Literature Review (2016). *RAWP risk appetite literature review*. Prepared by the Risk Appetite Working Party. Retrieved from: <http://www.actuaries.org.uk>
- Shang, K. & Chen, Z. (2012). *Risk appetite: Linkage with strategy planning*. A publication of the Society of Actuaries. Retrieved from: <https://www.actuaries.ie>
- Sheikh, S., Syed, A. M. & Shah, S. S. A. (2018). Corporate reinsurance utilisation and capital structure: Evidence from Pakistan insurance industry. *The Geneva Papers on Risk and Insurance – Issues and Practice*, 43(2), 300-334. DOI: 10.1057/s41288-017-0063-2.
- Sognon, G. S. (2018). *Reinsurance and financial performance of short-term insurance companies in South Africa*. Unpublished Master's Degree Dissertation in Commerce and Development. Graduate School of Business, University of Cape Town, South Africa. Retrieved from: <http://www.uct.ac.za>
- Soye, Y. A. & Adeyemo, D. L. (2017). Evaluation of the impact of reinsurance mechanism on insurance companies sustainability in Nigeria. *International Journal of Research, Innovations and Sustainable Development*, 7(1), 177-190. Retrieved from: <http://www.academia.edu>
- Swiss Re. (2004). Understanding reinsurance: How reinsurance create value and manage risk, *Economic Research and Consulting, Swiss Reinsurance Company, Mythenquai 50/60*.

- Tang, K. S., & Weng, C. (2012). Enhancing insurer value using reinsurance and value-at-risk criterion. *The Geneva Risk and Insurance Review*, 37, 109-140. Retrieved from: <https://www.palgrave-journals.com>
- Veprauskaite, E. & Sherris, M. (2014). Reinsurance decisions in life insurance: an empirical test of the risk-return criterion. *International Review of financial Analysis*, 35, 128-139. Available at: <http://dx.doi.org/10.1016/j.irfa.2014.08.001>
- Yamane, T., (1967). *Statistics: An introductory analysis*, 2nd edition. New York: Harper and Row.