Revisiting Insurance Capital Structure, Risk-Taking Behaviour and Performance between 1995 – 2002

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Abstract

This paper examines the effect of capital structure and the moderation effect of risk-taking behaviour of insurance firms on performance of insurers in Nigeria from 1995 to 2002. This study became necessary as literatures in this area and regime are scarce. Secondary data from financial reports of each insurance firm were used. Descriptive statistics were used to describe the characteristics of the data while a two-stage estimation procedure of the fixed effect and random effect models were used to test the hypothetical framework of the study. Result shows that insurance capital structure (measured by equity ratio) had an insignificant negative effect on insurance performance while it had a significant positive effect on insurance performance if measured by technical provision ratios. On average, risk taking behaviour moderates the relationship between technical provision ratio and insurance performance. This study focused on capital structure and moderation effect of risk on performance of insurers in non risk-based capital era. Further study on risk-based capital era will provide more on performance of insurers before and after the implementation of risk-base capital requirement. These findings provide important insight to managers and regulators and investors by fostering more understanding of how to manipulate insurance capital and which source of fund should be used to embark on risky investment to attain superior performance. This investigation adds to literature on insurance capital structure, regulation and risk management and insurance performance in Nigeria.

Keywords: capital structure, risk taking behaviour, EPS, ROA, ex ante capital regime

1. Introduction

Capital structure is considered the foundation of corporate existence and has been studied extensively in corporate finance literature and related fields (Dhaene, Hulle, Wuyts, *et al.*, 2015). As an evidence, a total of 124 articles have been published on capital structure in reputable journals globally from 2009 – 2014 (Santosa & Farinellib, 2015). Theories of finance and especially capital structure and evidences from past studies discuss capital structure in terms of equity and financial debt. But for insurance companies, the capital structure is composed of equity and technical provisions (Florio & Leoni, 2017; Eling & Marek, 2014). Equity is the proportion of fund contributed by owners of the firm whereas technical provision is the combination of interest-bearing liabilities and non interest-bearing liabilities both of which add up to increase an insurers total liability with significant opportunity costs such as loss of business, loss of premiums, loss of profits, reduced credit worthiness, and high renting costs all of which can have negative effect on performance of insurance firms (Dhaene et al., 2015).

Unfortunately, "Although profitability has been widely investigated in manufacturing industries, far less attention has been paid to it in the financial sector (Pervan, Curak, & Mariajnovic, 2012, p.1). And again, "Although performance of other financial institutions i.e., banks are widely investigated, the empirical framework that at the same time analyzes the effect of insurance-specific, industry-specific and macroeconomic variables on insurance profitability are not so exhaustively analyzed" (Pervan & Kramarić, 2010, p.1). However, the tradeoff theory predicts that a firm's capital structure influences its performance (Abdeljawad, Mat-Nor, Ibrahim and Abdul-Rahim, 2013; Dang, Kim and Shin 2012, etc). In some empirical studies, a positive relationship between capital structure and firm performance was found (Bandyopadhyay and Barua, 2016; Fosu, 2013), others revealed a negative relationship (Avi, 2016; Nwude, *et al*., 2016; Chadha & Sharma, 2015) and in

between are studies with mixed and inconclusive findings (Chaudhuri et al., 2016; Davydov & Vahamaa, 2013).

The contradictory and mixed findings may not be unrelated to either wrongly calibrated capital structure used or omission of important variable. Consequently, other variables such as risk taking behaviour was suggested as one of the factors that can interact with capital structure to give better explanation of firm performance. Theoretically, the prospect theory predicts that a firm's risk profile can affect capital-performance relation (Holmes et al., 2011; Shimizu, 2007 etc). However, the axiom, *'the higher the risk, the higher the return'* suggests further that risk-taking by firms can moderate the relationship between capital and performance. Empirically, Baranoff, *et al.,* (2007), Shim and Lee (2017) and, Dan-Jumbo (2016) showed that risk-taking behaviour can affect the deployment of capital vis-à-vis firm performance; but these authors never tested these assumptions with known capital structure and performance proxies within insurance sector in a developing economy like Nigeria. Thus, while some literatures suggest that higher risk taking can leads to higher returns, some studies suggest otherwise.

The present study is thus different from past studies as it considers for analysis specific capital structure and performance variables in a direct and moderated research framework involving risk-taking in the Nigerian insurance sector in an era where capital regulation was considered non risk-based. This study contributes to literature by defining capital structure of insurance firms and broadening the scope of capital structure variables beyond financial debt to other non-interest bearing liabilities such as outstanding claims, creditors and accruals. It also contributes by extending the behavioural financial studies to the field of insurance through the incorporation of risk-taking measures. The study has also contributes to theory extension by applying prospect theory from psychology to management science studies. Subsequent sections of this paper are as follows: section two gives a brief review of relevant literature and empirical studies; section three presents data set and methodological issues, section four presents analysis and results and section five contains conclusion and make recommendations.

2. Literature review

2.1 Theoretical framework

Studies involving capital structure and firm performance have always been premised on the predictions of capital structure theories such as trade off theory (static or dynamic), perking order theory and, free cash flow theory, among others. In this study, the tradeoff theory (the dynamic version) is adopted. The dynamic trade-off theory predicts that a firm chooses capital structure based on the attributes that determined the costs and benefits of using debt dynamically (Onaolapo & Kajola, 2010). One of the attribute is tax benefits of debt which is traded off with costs of debt. RBC requires insurance firms to boost capital with either debt or equity. Therefore, the choice of debt or equity is dependent on the expected benefits of debt and such choice would have an effect on firm performance. However, prospect theory has been used in studies linking capital structure, risk management and firm performance. The theory states that firms exhibit both risk-seeking and risk-averting behavior when the outcome is either below or above reference points respectively (Holmes et al., 2011; Shimizu, 2007). By inference, firms would seek risk when performance is low. Logically, the essence of seeking risk is probably to improve performance. This would imply that high risk taking would result in high performance; and because risk seeking involves application and deployment of funds (equity or debt), the relationship between these funds and firm performance could be moderated by the level of risk taken by the firm. Prospect theory thus explains a firm's behavior in relation to risk-return association. In this study, the validity or otherwise of these theoretical assumptions is investigated.

2.2 Conceptual and empirical reviews

Some insurance scholars have argued that insurance capital structure is different from the capital structure of non-insurance firms because it focuses more on balancing equity and technical provision than financial debts (Dhaene et al., 2015; Eling & Marek, 2014). Therefore, insurance firms seemingly prefer self-financing to debt-financing (Dhaene et al., 2015). The key issue in insurance capital structure is technical provision which has led to different arguments on capital structure of insurance firms. Technical provision is the combination of creditors and accruals, outstanding claims and insurance funds. Insurance fund is the interest bearing liability (or debt); creditors and accruals and outstanding claims are non interest bearing liabilities which opportunity costs can increase insurers' liability and eventually lower performance. This has important performance implications for insurance firms and deserves empirical investigation especially, in the face of the divergent arguments in past empirical studies. For instance, some authors have argued that capital structure affect firm performance negatively (Avci, 2016; Foo et al., 2015); others said such relationship is positive (Fosu, 2013; Majumdar & Sen, 2010). Still, there are those who argued that there is no relationship (Chaudhuri et al., 2016; Davydov, 2016).

Nonetheless, one of the issues identified as being responsible for these divergent arguments is that performance

and capital structure are endogenous which leads to the problem of endogeneity. Modeled this way, the obtained empirical evidence may be misleading. Thus, considering capital structure, risk-taking and firm performance simultaneously in a moderated research framework that accounts for the endogeneity problem is necessary. This is especially important for insurance firms where performance is linked with capital and risk as hypothesized under risk-base capital (Yusof, Lau, & Osman, 2015; Cheng & Weiss, 2012a&b; Lai, 2011).

Risk is an inextricable part of organizational life and is the bedrock of any successful business (Dan-Jumbo, 2016). Empirical outcomes show that capital and risk-taking can interact to better explain firm performance (Mankaï & Belgacem, 2015; Cheng & Weiss, 2013; Jokipii & Milne, 2011). It is argued that insurer's safety (performance) depends jointly on the level of total risk in the insurer's asset-liability portfolio as well as its capitalization (Shim, 2010). Unregulated firms take excessive risk in order to maximize its value (Shim, 2010). All of these show that risk-taking behaviuor of firms is an important factor in the relationship between the firm's capital structure and its performance. Risk-taking is defined as choice among alternative outcomes under conditions of probabilistic uncertainty (Berglund, 2007); or the propensity to engage in behaviours that have the potential to be harmful or dangerous, yet at the same time provide the opportunity for some kind of outcome that can be perceived as positive (Allah & Nakhaie, 2011); or the engagement of significant resources to activities that have significant possibilities of failure, such as incurring heavy debt or making large resource commitments to grasp potential high benefits (Hamid, Rangel, Taib, & Thurasamy, 2013). Conventional corporate finance theorists and practitioners seem to treat capital and risk separately whereas there are evidences that a firm's capital, risk and performance are mutually inclusive (Shimpi & Re, 2002).

Zec (2012) opined that capital (structure) allocation has a link with insurance pricing, risk and performance management and thus serves as an instrument for managing insurance firms. In similar opinion, Baranoff et al. (2007) explained that insurer's capital structure decisions are made within the framework of enterprise risk. Some empirical studies showed a positive moderation effect of risk-taking on capital and performance (Yung-Chieh, 2016; Vatavu, 2015; Baxter et al., 2013; Hoyt & Liebenberg, 2011). Eikenhout (2015) found negation moderation and Hamidah (2016) found a mixed moderation effect of risk on capital and performance. There are also evidences that empirical research on capital structure, 'risk-taking behaviour', and firm performance were conducted in developed countries and markets and within non insurance firms. A few studies such as Kyereboah-Coleman (2007), Zeitun and Tian (2007), Abor (2007, 2005) among others empirically investigated this relationship in emerging markets.

Insurance-specific studies suggest that risk-taking may have been the missing factor in capital-performance relationship as results show that capital structure did not directly influence insurer's performance and that higher capital requirement was less important for insurance firms (Muhlnickel et al., 2016). Kaya (2015) found that insurers' leverage ratio which measures capital structure had a negative effect on profitability at a very low level. Adams and Buckle (2003) found that highly leveraged, low liquid insurers and reinsurers performed better, meaning that capital structure positively affects insurance performance. They also found that performance was positively related to risk-taking. Moreover, the relationship among capital structure and performance may change because of regional factors (developed or emerging market), or organization types (insurance or non insurance) (Shyu, 2013). So, a study that centers on insurer's capital structure, risk-taking behaviour and performance is also important. This could become an important corporate performance model that integrates more complex financing and risk management dilemma and could be used to achieve a better understanding of appropriate capital structure mix and risk-taking propensity of insurance firms in emerging markets.

As stated earlier, the present investigation extends and broadened literature on capital structure, corporate risk-taking and firm performance by empirically examining the relationship among insurers' capital structure, risk profile and performance in Nigeria. Nigeria is considered for some critical reasons. First, Nigeria is an emerging market with high market frictions, imperfection, asymmetric information all of which provide a better testing ground for financial theories. Second, Nigeria is the biggest insurance market in Africa with huge potentials as well as weaknesses which has caused large insurance business to be underwritten by foreign companies. Currently, the domestic industry is not only poised to penetrate deeper in the domestic market but to expand to other regions of the continent. Efforts are therefore, required to strengthen the capacity through serial capital-based regulations for better performance. As noted by El-Sayed (2009), this nature of market environment may cause capital structure decisions to be incomplete and vulnerable to reasonable extent of irregularity. It thus follows that for firms to survive and perform better under such environment, managers must exhibit commendable ingenuity in capital structure mix and enterprise risk management. Also, there should be studies to provide empirically proven evidences to guide the firm in financing choices, adequate risk-taking for improved performance. It is important therefore, to take another look at the validity of insurer's capital structure

(financing) mix and performance in the presence of risk-taking preferences under this unique liabilities compositions and economic setting.

3. Data and methodology

3.1 Sample and data set

Given the uniqueness of insurance capital structure and research imperatives, this study used all listed insurance companies that are currently trading on the Nigerian Stock Exchange (NSE). From the NSE Fact book and, the Nigerian Insurance Statistics and Directory 2010, of the total numbers of forty eight (48) insurance companies operating in Nigeria, twenty six (26) companies are listed and trade on the floor of the Nigerian Stock Exchange (NSE). Out of the 26 listed companies, fifteen (15) had relevant information and data available. Four (4) captives and two (2) reinsurers were also not included in the study because of lack of data on one hand, and peculiar nature of their operation on the other hand. Altogether, this study will be conducted using a sample of 15 insurance firms.

3.2 Variable measurement and hypotheses development

3.2.1 Insurance performance

Performance is somewhat a difficult concept in terms of definition and measurement. In this study, earnings per share (EPS) and returns on asset (ROA) are used. EPS is a profitability measure indicating how much profit a share has generated with shareholders' fund while ROA represent how efficient the management of insurance firm have been at managing the firm's asset. Addition of EPS to ROA is because it is the least examined market performance measure in empirical literature. It is a measure of operational efficiency considered to be more appropriate and advantageous than other measures (Berger & Di Patti, 2006; Margaritis & Psillaki, 2007).

3.2.2 Capital structure.

Consistent with the above argument and similar to past studies (Shim, 2010; De Haan & Kakes, 2010), capital structure was measured in this study by technical provision ratio (TPR) and equity ratio (TPR). TPR demonstrates the relationship between total liabilities and total assets. Muscettola (2013) said borrowed capital (i.e. technical provisions) can create as well as destroy wealth. Muhlnickel, et al. (2016) argued that higher capital requirements are important to small insurers. EQR represent the proportion of owners' fund to total capitalization of the firm. Some empirical studies showed that investment with equity do have a negative present value (Dittmar & Mahrt-Smith, 2007; Pinkowitz, Stulz, & Williamson, 2006). While we expect a positive relationship between TPR and firm performance, we however, expect EQR to relate negatively to insurance performance. We therefore hypothesized as follows:

H1a: There is a positive relationship between technical provision ratio and EPS of insurance companies during NRBC regime in Nigeria.

H1b: There is a positive relationship between technical provision ratio and ROA of insurance companies during NRBC regime in Nigeria.

H1c: There is a negative relationship between equity ratio and EPS of insurance companies during NRBC regime in Nigeria

H1d: There is a negative relationship between equity ratio and ROA of insurance companies during NRBC regime in Nigeria

3.2.3 Corporate Risk-taking behavior (CRB)

In this study, industry median of total technical provision is used as reference point and CRB was measured as a binary variable taking the value of 1 for risk-taking firms with technical provision value above the median at any given year and 0 otherwise. This is consistent with Chen (2008). Empirical evidence shows that high risk-taking moderates capital structure and performance. However, such evidence on whether the performance will be stronger with risk-taking than with risk-averse firms are rare (Delmar et al., 2013; Bromiley, 2010; Gomez-Mejia et al., 2007). In this study, the hypotheses below will be tested:

H2a: CRB will positively moderates the relationship between insurer's capital structure (EQR) and insurers' performance (EPS) during NRBC regime in Nigeria.

H2b: CRB will positively moderates the relationship between insurer's capital structure (EQR) and insurers' performance (ROA) during NRBC regime in Nigeria

H2c: CRB will positively moderates the relationship between insurer's capital structure (TPR) and insurers' performance (EPS) during NRBC regime in Nigeria

H2d: CRB will positively moderates the relationship between insurer's capital structure (TPR) and insurers' performance (ROA) during NRBC regime in Nigeria

3.2.4 Control variables

Prior researches (Bandyopadhyay & Baura, 2016; Kartheeswari, & Rajeswari, 2012) suggest some variables that affect performance and as such must be controlled while investigating capital structure relation with performance. The variables are asset growth, tangibility, interest rate, inflation rate and GDP rate. The operational definition of EPS and ROA are shown in Table 1.

Table 1. Variables description and expected signs

Variables	Description	Code	Expected Signs EPS
Dependent			(+/-)
Earnings per share	Ratio of net profit to number of equity shares	EPS	
Returns on assets	Ratio of net profit to total asset	ROA	
Independent:			
Equity Ratio	Ratio of shareholders fund to total capitalization	EQR	−
Technical provision ratio	Ratio of total technical reserves to total assets	TPR	+
Moderating			
Risk-taking behaviour	Dummy variable 1 for risk-taker and 0 otherwise	CRB	+
Controlled:			
Asset tangibility	Ratio of fixed asset to total asset	TAN	−
Insurer's growth	Ratio of change in total asset to total asset	IGW	+
Interest Rate	Yearly nominal interest rate in %age	INR	−
Inflation rate	Annual consumer price index in %age	INF	−
Growth rate of GDP	Value of gross total annual output in %age	GDP	+

3.3 Model estimation

To solve the endogeneity problem, the present study employed a fixed effect (FE) and random effect (RE) method of estimation using panel data from fifteen (15) insurance firms in Nigeria for the period of eight (8) years. Our model estimation follows Abata and Migiro (2016), Olokoyo (2013), Semykina and Wooldridge (2010) as well as the leverage determinant model of the dynamic tradeoff theory. We adopt two stage least square estimation procedures to account for the endogeneity problem in our estimated models. Therefore, the baseline panel data regression models for this study are as follows:

$$caps = \delta_t + \alpha_1 eps_{i,t} + \alpha_2 roa_{i,t} + \alpha_3 crb_{i,t} + \alpha_4 gdp_{i,t} + \alpha_5 inf_{i,t} + \alpha_6 tan_{i,t} + \alpha_7 igw_{i,t} + \mu_{i,t} \quad (1)$$

$$Perf = \delta_t + \alpha_1 \widehat{cap}_{i,t} + \alpha_2 crb_{i,t} + \alpha_3 gdp_{i,t} + \alpha_4 inf_{i,t} + \alpha_5 tan_{i,t} + \alpha_6 igw_{i,t} + \mu_{i,t} \quad (2)$$

$$Perf = \delta_t + \alpha_1 \widehat{cap} * crb_{i,t} + \alpha_2 gdp_{i,t} + \alpha_3 inf_{i,t} + \alpha_4 tan_{i,t} + \alpha_5 igw_{i,t} + \mu_{i,t} \quad (3)$$

Where $caps = \widehat{cap} = [\widehat{eqr}$ = adjusted treatment equity ratio, $\widehat{tpr}$ = adjusted treatment technical provision ratio]; Perf = performance measures (EPS and ROA; δ = constant term, α = beta coefficient for regressors and controlled variables, μ = stochastic error term. Other variables in the models are as defined in Table 1. However, model 1 is used to test for the first stage effect of instrument-treatment correlation via regression on measures of capital structure and controlled variables. Models 2 and 3 are used at the second stage to test for estimated direct and moderation effect of the treatment and risk variable on EPS and ROA.

4. Results and discussion

4.1 Descriptive statistics

Table 2 contains descriptive statistics of all variables used in this study. However, discussions on descriptive statistics were limited to key variables of the study (EPS, ROA, EQR, TPR, and CRB). From the table, mean value for EPS and ROA were 11.206 and 0.085 respectively. This suggests that insurance companies studied, on average, have relatively strong performance in terms of EPS and weak performance in terms of ROA for the period reviewed. The mean values for EQR and TPR were 0.548 and 0.430, suggesting that 54.8% and 43% of

total asset of the companies were finance by equity and technical provision respectively. The mean value for CRB was 0.500, which shows that, on average, insurance companies were 50% risk taking and 50% risk averse.

Table 2. Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Eps	120	11.206	36.544	-140.000	133.900
Roa	120	0.085	0.151	-0.223	0.699
Eqr	120	0.548	0.169	0.161	0.902
Tpr	120	0.430	0.245	0.097	1.718
Crb	120	0.500	0.502	0.000	1.000
Gdp	120	5.590	1.996	2.236	7.701
Inr	120	-0.738	21.603	-43.570	25.280
Ifr	120	20.732	20.999	6.618	72.729
Tan	120	0.268	0.240	0.005	1.130
Igw	120	70.206	765.976	-0.722	8391.135

4.2 Correlations

Table 3 contains correlation between variables, high correlation was observed between INR and INF. Consequently INR was excluded from the model. Generally, the correlation indicates that EQR has a negative impact on EPS and positive correlation on ROA. The level of risk preference and INF both correlated positively with EPS and negatively with ROA. Whereas INR, TAN and IGW have negative correlation with EPS, they however correlate positively with ROA except TAN. GDP have a positive correlation with both EPS and ROA. Overall, at 70% threshold, there were no significant correlations among the variables used for this study.

Table 3. Correlation between variables

	eps	roa	tpr	eqr	crb	Gdp	inr	ifr	Tan	igw
Eps	1.0000									
Roa	0.2687	1.0000								
Tpr	0.0842	0.1190	1.0000							
Eqr	-0.2434	0.0827	-0.6566	1.0000						
Crb	0.1290	-0.1333	0.2718	-0.3761	1.0000					
Gdp	0.0005	0.0133	-0.0078	0.0439	0.1929	1.0000				
Inr	-0.0649	0.0438	-0.0683	0.1289	0.1439	0.2962	1.0000			
Ifr	0.0986	-0.0397	0.0483	-0.1292	-0.2469	-0.4547	-0.7495	1.0000		
Tan	-0.3254	-0.1619	0.2001	-0.0353	-0.0814	-0.0272	0.0348	-0.0244	1.0000	
Igw	-0.0281	0.0469	0.0001	0.0073	0.0916	-0.1287	0.0149	-0.0618	-0.0819	1.0000

4.3. Regression results

Table 4 presents empirical result of our analysis in three panels or sections. Panel A contain result for model 1 which was used to obtain the predicted value for the respective capital structure measures in an attempt to account for endogeneity in our models. Panel B and C contain results for the direct and moderating effect of capital structure, risk taking behaviour and insurance performance respectively. The first column contains the various explanatory variables. Columns 2 and 3 report the results for fixed effect (FE) and Random effect (RE) respectively for each dependent variable. However, results from the final regression on ROA for models were reported in column 4- 'corrected'. Following the column for constants in each model were results of relevant model diagnostic tests. In other words, all tests were performed with random and fixed effect and the results, by comparison, are similar. For the sample and period considered, the Hausman test showed that random effect is more relevant in every EPS regression. This implies that differences between insurance firms do not maneuver the relationship between the variables considered. This is also true for every regression on ROA except for some models where fixed effect models corrected for time-fixed effects, heteroskedasticity and serial correlation were considered.

Table 4. Results of the interrelationship among capital structure, risk taking and insurance performance

Panel A: Insurance performance and capital structure					
Regressands	Technical provision ratio (tpr)			Equity ratio (eqr)		
Regressors	RE	FE	RE – Panel corrected	RE	FE	RE – Panel corrected
Eps	-0.082	-0.115	-0.152	-0.073	-0.032	-0.067
	[0.576]	[0.447]	[0.274]	[0.489]	[0.767]	[0.407]
Roa	0.737***	0.836***	0.523**	0.032	0.004	0.066
	[0.000]	[0.000]	[0.008]	[0.742]	[0.966]	[0.434]
Crb	-0.058	-0.061	-0.063	-0.009	-0.016	-0.005
	[0.113]	[0.101]	[0.151]	[0.718]	[0.554]	[0.883]
Gdp	0.019	0.018	0.002	-0.013	-0.015	-0.009
	[0.618]	[0.638]	[0.940]	[0.626]	[0.598]	[0.562]
Inf	0.101**	0.102**	0.060	-0.082**	-0.083**	-0.062**
	[0.024]	[0.024]	[0.190]	[0.011]	[0.012]	[0.023]
Tan	0.006	0.020	-0.008	0.044	0.052	0.064
	[0.944]	[0.824]	[0.949]	[0.468]	[0.421]	[0.301]
Igw	-0.271**	-0.248**	-0.225**	0.181**	0.174**	0.169**
	[0.004]	[0.011]	[0.019]	[0.008]	[0.013]	[0.003]
cons.	0.138	-0.248	0.285	0.462**	0.450*	0.351*
	[0.658]	[0.430]	[0.334]	[0.038]	[0.050]	[0.066]
F-test		8.81***			2.04*	
R2	0.0434	0.0342	0.3402	0.0662	0.0421	0.3625
Hausman Chi2(10)	10.27			3.93		
Wald chi2 (15)						
Wooldridge f-test	6.235**			31.476***		
Mean VIF			1.23			1.23
Panel B: Capital structure and insurance performance					
Regressands	Earnings per share (EPS)			Returns on assets (ROA)		
Regressors	RE	FE	RE	FE	FE – Robust
$\widehat{tpr}$	0.165**	0.141*	1.077***	1.076***	1.076***
	[0.024]	[0.072]	[0.000]	[0.000]	[0.000]
crb	0.059***	0.054**	0.073***	0.072***	0.072***
	[0.000]	[0.003]	[0.000]	[0.000]	[0.000]
gdp	0.015	0.017	-0.016	-0.016	-0.016**
	[0.408]	[0.353]	[0.164]	[0.168]	[0.032]
Inf	0.101	0.015	-0.105***	-0.105***	-0.105***
	[0.656]	[0.511]	[0.000]	[0.000]	[0.000]
tan	-0.027	0.026	0.004	0.014	0.014
	[0.468]	[0.550]	[0.871]	[0.585]	[0.792]
Igw	0.039	0.031	0.244***	0.241***	0.241**
	[0.466]	[0.566]	[0.000]	[0.000]	[0.005]
cons.	0.241**	0.244**	0.615***	0.615**	0.615**
	[0.023]	[0.026]	[0.000]	[0.000]	[0.000]
F-test		2.23**		94.68***	199.94***
R2	0.2425	0.1389	0.5040	0.4954	0.4954
Hausman Chi2(10)	10.92		119.45***		
Wald chi2 (15)				650.11***	
Wooldridge f-test	2.129		3.276		
Mean VIF	1.31		1.31		

Table 4 continues……

$\widehat{eqr}$	-0.109	-0.130	-0.008	0.036	
	[0.388]	[0.437]	[0.935]	[0.890]	
crb	0.047**	0.043**	0.019	0.006	
	[0.004]	[0.016]	[0.311]	[0.826]	
gdp	0.017	0.018	0.021	0.021	
	[0.356]	[0.343]	[0.548]	[0.556]	
inf	0.017	0.017	0.044	0.066	
	[0.494]	[0.511]	[0.631]	[0.492]	
tan	-0.015	0.027	0.012	0.081	
	[0.694]	[0.547]	[0.763]	[0.297]	
igw	-0.009	-0.005	-0.259***	-0.308***	
	[0.850]	[0.917]	[0.001]	[0.001]	
cons.	0.438***	0.433***	0.298**	0.312	
	[0.000]	[0.000]	[0.032]	[0.100]	
F-test		1.74		2.86**	
R2	0.1690	0.0850	0.1131	0.0139	
Hausman Chi2(10)	5.34		6.47		
Wooldridge f-test	2.377		1.722		
Mean VIF	1.23		1.25		

Panel C: Capital structure risk-taking (or interaction terms) and insurance performance

Regressands	Earnings per share (EPS)		Returns on assets (ROA)		
Regressors	RE	FE	RE	FE	FE – Robust
	0.044	0.046	0.035	0.023	-0.551
$\widehat{eqr}$*crb	[0.173]	[0.206]	[0.274]	[0.652]	[0.401]
gdp	-0.053**	-0.053**	0.022	0.022	0.095
	[0.032]	[0.039]	[0.536]	[0.535]	[0.457]
inf	0.103	0.104	0.047	0.062	0.009
	[0.110]	[0.112]	[0.606]	[0.504]	[0.952]
tan	-0.149***	-0.125**	0.012	0.082	-0.008
	[0.001]	[0.019]	[0.748]	[0.272]	[0.879]
igw	0.060	0.066	-0.261***	-0.307***	-0.028
	[0.301]	[0.271]	[0.001]	[0.001]	[0.626]
cons.	0.349***	0.331**	0.293**	0.328**	3.575**
	[0.001]	[0.002]	[0.027]	[0.028]	[0.255]
F-test		3.48**		3.51**	4.81**
R2	0.2992	0.2914	0.1144	0.0140	0.0140
Hausman Chi2(10)	0.94		5.49		
Wooldridge f-test	0.605		1.754		
Mean VIF	1.27		1.27		
	0.081*	0.063	0.111**	0.107*	
$\widehat{tpr}$*crb	[0.053]	[0.170]	[0.048]	[0.066]	
gdp	-0.054**	-0.055**	0.008	0.009	
	[0.028]	[0.030]	[0.753]	[0.739]	
Inf	0.099	0.103	-0.020	-0.018	
	[0.126]	[0.117]	[0.529]	[0.568]	
tan	-0.044***	-0.116**	-0.023	-0.009	
	[0.001]	[0.030]	[0.707]	[0.886]	
Igw	0.064	0.073	-0.199**	-0.207**	
	[0.265]	[0.216]	[0.002]	[0.002]	

Cons.	0.345***	0.324**	1.624***	1.631***
	[0.001]	[0.002]	[0.000]	[0.000]
F-test		3.55**		2.92**
R2	0.3538	0.3451	0.0369	0.0301
Hausman Chi2(10)	1.75		2.90	
Wooldridge f-test	0.538		0.000	
Mean VIF	1.25		1.19	

***, **, * Significant at 1%, 5% and 10% value respectively

4.3.1 The effect of insurance performance on capital structure

The first concern was to conduct regression on performance and capital structure. Under Panel A of Table 4, the results indicate that ROA significantly influence technical provision fund but not equity fund. Looking at the expected signs, all variables demonstrate that performance relate negatively with equity fund and positively with technical provision fund. Consequently, we confirmed that both performance and capital structure measures are endogenous, hence the choice for two-stage estimation procedure to solve for the problem of endogeniety in our model.

4.3.2 The effect of capital structure on earnings per share (EPS)

From the direct effect models under panel B in Table 4, RE regression on EPS was statistically significant: TPR and CRB had slightly bigger and smaller coefficients respectively. It can thus be assumed that the more technical provision insurers employ the better their EPS. Consequently, we retained hypothesis 1a. EPS also increase with risky investments, showing that insurers were relatively risk-takers during the period covered. With equity ratio as the explanatory variable, the RE model returns a significant positive coefficient for risk taking only. This shows also that, insurance firms in Nigeria benefited by taking risk. However, equity ratio was not significant in the model although it has the right sign. Consequently, hypothesis 1c was retained, meaning that equity ratio reduces EPS but such reduction is of little concerns. Overall, no regression model is irrelevant, but the best to explain the direct effect on EPS is RE tested for autocorrelation and multicollinearity since R^2 values of 24.25% and 16.90% represent considerable explanatory power.

4.3.3 The effect of capital structure on returns on assets (ROA)

In relation to ROA, the corrected FE model also under panel B in Table 4 shows TPR, risk-taking, gross domestic product, inflation, and firm growth as statistically significant influencers of ROA. Again, it can be inferred that more TPR led to more ROA, hence hypothesis 1b is retained. ROA also improved with risk-taking and firm growth but reduces with gross domestic product and inflation. It can be deduced that during the period covered, high macroeconomic shocks, occasioned by high inflation and gross domestic product, affected insurers negatively, while firms may have leveraged on their specific attributes and competencies for sustained performance. On the contrary, EQR is not statistically significant while firm growth is negative and significant in the model. We interpret this to mean that growth with equity financing firms recorded negative impact on ROA. Model has marginal explanatory power though, but based on this result, hypothesis (1d) is retained, meaning that EQR has an insignificant negatively association with ROA.

4.3.4 The moderation effect of risk-taking on capital structure and EPS

On the interaction of risk-taking and capital structure (measured by equity ratio) to explain variations in EPS, results under Panel C in Table 4 returns an insignificant interaction term with a statistically significant and negative gross domestic product and tangibility, hence hypothesis 2a was rejected. This implies that taking more risk with equity capital does not result in higher returns or performance in terms of EPS. However, in the model, it is shown that a higher gdp and tangibility reduced EPS. We interpret thus that the firms may not have taken advantage of the improved economic condition by divesting. Also, the negative effect of tangibility on EPS shows that the firms owned large proportion of fixed assets but could not use their assets effectively while opting for equity as their prime source of financing. With TPR, the RE model returned a significant positive interaction term together with a significant negative gdp and tangibility, hence the retention of hypothesis 2c. We assumed that risk-taking moderates the relationship between TPR and EPS. This goes further to mean that taking more risk with TPR produces higher EPS. Nevertheless, the firms still had high and poorly managed fixed asset as well as undiversified portfolio and may not have been able to benefit from the improved economic condition.

4.3.5 The moderation effect of risk-taking capital structure and ROA

The last two moderation effect results under Panel C on Table 4 are consistent with the preceding two models

except for risk-taking with equity fund: the Hausman test returned FE instead of RE as best predicting model for ROA regression. Therefore, a fixed effect model corrected for heteroskedasticity and autocorrelation returned results that were not statistically significant. Consequently, hypothesis 2b was rejected and the implications of the previous model with EPS as regressand apply. On the opposite, the last model returns the interaction term as statistically significant factor and a statistically significant and negative growth. Like it was with EPS, hypothesis 2d was retained. Thus, taking more risk using TPR led to higher ROA. Furthermore, fixed assets was not properly managed to compliment the gains while the companies were unable to exploit to their advantage, the improved macroeconomic condition in GDP. Again, the explanatory power of the model is weak suggesting that other variables should have been included to better explain the variance in ROA. Based on our empirical results we summarized the decision concerning the hypotheses of the study in Table 5.

Table 5 – summary decision on statement of hypotheses developed for the study

Hypothesis	Statement of hypothesis	Decision
1a	There is a positive relationship between technical provision ratio and EPS of insurance companies during NRBC regime in Nigeria.	Accepted
1b	There is a positive relationship between technical provision ratio and ROA of insurance companies during NRBC regime in Nigeria	Accepted
1c	There is a negative relationship between equity ratio and EPS of insurance companies during NRBC regime in Nigeria	Accepted
1d	There is a negative relationship between equity ratio and ROA of insurance companies during NRBC regime in Nigeria	Accepted
2a	CRB will positively moderates the relationship between insurer's capital structure (EQR) and insurers' performance (EPS) during NRBC regime in Nigeria	Rejected
2b	CRB will positively moderates the relationship between insurer's capital structure (EQR) and insurers' performance (ROA) during NRBC regime in Nigeria	Rejected
2c	CRB will positively moderates the relationship between insurer's capital structure (TPR) and insurers' performance (EPS) during NRBC regime in Nigeria	Accepted
2d	CRB will positively moderates the relationship between insurer's capital structure (TPR) and insurers' performance (ROA) during NRBC regime in Nigeria	Accepted

4.4 Discussions of Findings

Overall, all estimated models had no multicollinearity since all respective variance inflation factors (VIF) were less than the threshold of 10. Implicitly therefore it can be deduced from table 5 that insurers' capital structure measured by EQR and insurance performance relate negatively thus conforming to the negative relationship predicted by dynamic tradeoff theory. This means that more capital structure, probably without good application hurt insurers' performance. Measured as TPR, insurers' capital structure, on average, exhibits opposite behaviour during the period under review. Our finding is supported by other empirical studies (Avi, 2016; Nwude, *et al.,* 2016; Shyu, 2013), and is contrary to others (Bandyopadhyay and Barua, 2016; Fosu, 2013). The findings reveal that, how capital structure is measured is of great concern to the management of insurance companies. This would practically mean that the choice of financing and strategies adopted in terms of risk taking preferences would be a critical decision area to insurers. Our empirical evidences suggest that it pay more for insurers to use technical provision fund than equity. Moreso, investment in risky projects paid off with technical provision (or external) financing than with equity (or internal) financing as more risk taking will generate more returns in terms of EPS and ROA. This goes against empirical outcome showing that R&D expenditure spending which itself is one measure of firm risk taking is a heavy burden that reduces operational efficiency, thus affecting firm performance negatively (Shyu, 2013). Vatavu (2015) had also found a significant positive and direct effect of business risk on performance. Thus, the more technical funds insurers had, the more efficient they were ,whereas, the more equity funds insurers had, the less efficient they were during the period reviewed.

5. Conclusions and implications of study

In this paper we investigated the direct and indirect interrelationship among capital structure, risk taking behaviour and insurance performance. Between 1995 and 2002, profitable insurance firms were those that maintained high proportion of technical provision fund in their capital mix, avoiding equity funding as it had, albeit insignificant, a negative impact on performance indicators. Moreover, the most profitable insurers were high risk takers who committed high proportion of technical provision funds in high risk investments during the period while those who invested high proportion of equity funds lost during the period. Referring to the

controlled variables, it does appear that inflation has a negative impact on ROA when investment is made with technical provision fund than with equity funds. This means that low profits, in terms of ROA, are associated with high inflation rates. Logically, it could be assumed that during times of high inflation, insurance firms in Nigeria may have had a concentrated rather than a diversified portfolio of assets. The negative relationship between tangible asset and performance (EPS) in the interaction model would also serve as prove of inefficient asset/portfolio management at that instance. This implies that during high inflation the companies could not drop some of their assets as well as some costs; hence they record losses some in ROA regardless of whether they are risk takers or risk haters.

On tangibility, firms that owned large proportion of fixed assets, record lower earnings per share in high risk investments via equity fund. Considering that insurance firms are unlikely to assume valuable investment and continuous development like manufacturing firms do, this type of relationship is expected much as the result has shown that the firms have not managed their asset efficiently. On growth of gross domestic product, a negative relationship found means that the level of GDP in Nigeria as a developing nation is low. And a low level GDP implies low firm performance in terms of ROA, especially when they deploy more technical provision fund to investment and in terms of EPS when investing equity in high risk projects. Considering asset growth, insurance performance (ROA) is reduced. This signifies that they do not use equity fund for long term investment which is their nature of business operations.

This study has some theoretical, practical and policy implications. Theoretically, when analyzing capital structure of insurance firms, proxies used are of great concern. Whereas, technical provision contradicts, equity fund conforms to the predictions of the dynamic tradeoff theory. It will require an insightful consideration of the specific components of capital structure beyond equity and interest-bearing liabilities (debt). Therefore, when linking capital structure to insurance performance, a combination of capital structure theories would holistically explain such relationship better. Practically, choice of funding is an important financial decision for management of insurance companies. Insurers benefit more both in terms of EPS and ROA when deploying technical provision to finance their investments and moreso when embarking on high risk investments. The policy implication of the study is that, a policy directive, particularly on non interest-bearing proportion of technical provision fund would be necessary for optimal usage of TPR by insurers. The characterized overdependence on equity financing may be deemphasized in such policy directive. These however, would demand from both stakeholders a critical consideration of the prevailing macroeconomic conditions in the country for better operations and regulations.

Overall, some models involving predominantly ROA exhibit marginal explanatory power except technical provision. This indicates that our variables of interest are not key determinants of ROA. For better understanding of what affects insurance performance in terms of ROA in the presence of risk and in a non risk-based capital scenario, future research should explore other conceivable explanatory variables as well as various performance indicators. Insurance companies should capitalize and exploit technical provision fund particularly when embarking on high risk investments. They should be risk takers than risk haters. Similar study is recommended to be carried out in a risk-based capital regime to provide complementary results to the findings of the study. Such study can be absolute or comparative both of which would provide empirical evidence on which policy regime is best for insurance operations.

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