Debt Financing and Performance of Indigenous Oil and Gas Operators: Some Selected Marginal Fields in Nigeria

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Abstract

The objectives of marginal fields were amongst other factors to create wealth, stimulate indigenous participation and increase government revenue from oil and gas. Several challenges have hindered the potential role of marginal field development and inadequate finance is a major setback. This study analyzed the relationship between debt finance and the performance of marginal oil fields in Nigeria. Feasible generalized least square and Panel spatial correlation consistent fixed effects methods were used to analyze data from 2011 to 2021. Return on Asset (ROA) and Return on Equity (ROE) were performance measures used as explained variables. Debt indicators are long term debt and short-term debts. Size and taxation were control variables. Findings show long-term debt and short-term debt have inverse and significant impact on performance. Equity was preferred by indigenous oil and gas companies to debt finance, as high debt policy results in lower performance. The study recommends shareholders and managers of marginal fields to focus on strategic debt policy that will enhance their access to finance and increase firms' values.

1.0 INTRODUCTION

The concept of marginal fields started with the Petroleum Amendment degree in 1996, where the Federal Government of Nigeria took ownership of 183 oil fields with an estimated 2.3 billion barrels of stock tank oil initially in place (STOIIP). In 2001, the Department of Petroleum Resources (now Nigerian Upstream Petroleum Regulatory Commission) awarded the first set of 24 marginal fields to 30 indigenous oil and gas companies. By the end of 2021, 19 fields were producing as shown in Table 1.1. Recently, in June 2022, 57 Petroleum Prospecting Licenses (PPL) were awarded to 161 indigenous companies. While 11 field licenses were voided due to poor performance in 2020. Marginal Field Development in the prolific Niger Delta environment is of strategic importance to the Federal Government of Nigeria's drive towards aggressive Reserve and Production Capacity enhancement (Adamu, Ajienka and Ikiensikimama, 2013). They have the potential to create wealth and promote indigenous participation in the oil and gas industry. Despite this potential role in economic growth, indigenous operators are confronted with several challenges of field development.

Chijioke (2013), opined that the main reason why the Government took undeveloped discoveries, with proven oil, from oil majors and award them to local companies, were to encourage indigenous capacity building, increase production, provide an opportunity for portfolio rationalization, increase revenue and create more employment. Most fields have remained underdeveloped or abandoned due to a combination of economic and technical challenges. Oruwari (2018a), opined that insecurity, inadequate infrastructure, high-interest rate, inadequate regulatory framework and multiple taxations are major factors militating against the operations of marginal fields in Nigeria. The study further identified funding as the greatest challenge facing marginal field development in Nigeria. Eyankware and Esaenwi (2019) identified lack of funding, subsurface risks and uncertainties, crude oil price instability, social, political, environmental, and technical issues as challenges which have hampered successful development of marginal fields into profitable ventures.

Table 1.1: List of Producing Marginal fields in Nigeria, at January 1, 2021

S/No	Field Name	Company Name	Block
1	Ogbele	Niger delta Petroluem Resources limited	OML 54
2	Omerelu	Niger delta Petroluem Resources limited	OML 53
3	Asaramatoru	Prime Exploration & Production (Operator)/Suffolk Petroleum Limited	OML 11
4	Okwok	Oriental Energy Resources Limited	OML 67
5	Ebok	Oriental Energy Resources Limited	OML 67
6	Stubb	Creek Universal Energy Limited	OMLs 13 / 14
7	Umusati/Igbuku	Pillar Oil Limited	OML 56
8	Egbaoma (Ex Asuokpu/Umutu)	Platform Petroleum Limited	OML 38
9	Amoji /Matsogo / Igbolo	Chorus Energy Limited	OML 56

10	Oza	Millenium Oil and Gas Limited	OML 11
11	Ajapa	Brittania U	OML 90
12	Qua Ibo	Network E&P Limited	OML 13
13	Ibigwe	Waltersmith Petroman Limited (Operator)/Morris Petroleum Limited	OML 16
14	Umusadege	Midwestern Oil and Gas Limited/Suntrust Oil Company Limited	OML 56
15	Uquo	Frontier Oil Limited	OML 13
16	Ebendo/Obodeti (Ex Obodugwa /Obodeti)	Energia Limited (Operator)/Oando Production and Development Limited	OML 56
17	Eremor	Excel Exploration & Producton Limited	OML 46
18	Otakikpo	Green Energy International Limited	OML 11
19	Ubima	All Grace Energy Limited	OML 17

Source: NNPC Ltd

Idigbe and Bello (2013) identified keys to sustainable operation of marginal fields in Nigeria as: Creating and enhancing better host communities' relationships; A more effective micro-development of the host communities; Greater involvement in education, and local solutions to oil and gas operations; Participation in local micro refineries, by the supply of crude oil. The poor performance of marginal fields has been attributed to inadequate finance, unfriendly business environment, unfavorable fiscal regime, insecurity, lack of infrastructure and asset vandalism (Ogunsola-Saliu, Falode & Adenikinju, 2019; Oruwari, 2018a; and Akinwale & Akinbami, 2016).

Dolapo (2018) opined that Nigeria's oil upstream runs on debt. Banks provided over USD$20 billion towards oil and gas entire valve chain in 2014, while quoted companies raised less than $1billion in equity. Dolapo further reiterated that two years before crude oil prices began to fall in mid-2014; Nigeria banks lend an estimated USD$10 billion to local oil and gas companies to acquire assets from Eni, Total and Shell as they divest their onshore assets in the Country. Commercial Banks remains the biggest source of debt finance to indigenous companies.

Debt funding is limited by the size of bank balance sheets, ability to raise dollar loans (credit from foreign lenders) and lending rates. Nwaozuzu (2014) suggests that, most bankers insist, the problem with funding Marginal fields is the lack of collateral and the only asset available is often the reserve in the field itself. The concept of Reserve-Based Lending, that accepts hydrocarbon in the ground (subsurface reservoir) as collateral is yet to be embraced by Nigeria local banks. This negates the core moral concepts and principle of awarding marginal field to indigenous oil and gas companies.

1.1 AIM AND OBJECTIVES OF STUDY

The aim of this study is to evaluate the impact of debt finance on the Performance of producing Marginal fields in Nigeria.

The specific objectives are:

1. To determine the effect of Long-term debt on the Marginal field's performance.
2. To determine the effect of short-term debt on the Marginal field's performance.

1.2 RESEARCH HYPOTHESES

Based on the objectives the following research hypotheses were specified in null forms.

H_{01}: There is no significant relationship between Long term debts and Return on Assets of Marginal fields in Nigeria.

H_{02}: There is no significant relationship between short term debts and Return on Assets of Marginal fields in Nigeria.

H_{03}: There is no significant relationship between Long term debts and Return on Equity of Marginal fields in Nigeria

H_{04}: There is no significant relationship between short term debts and Return on Equity of Marginal fields in Nigeria.

The rest of the paper is organized as follows: Section 2 reviews previous debt finance and firm performance. Section 3 presents the methodology. Section 4 explains the empirical results and Section 5 offers the conclusion and recommendations.

2.0 LITERATURE REVIEW

2.1 Modigliani and Miller Theory

Modigliani and Miller (1958) were the pioneers in theoretical evaluation of corporate finance in modern times, there was no acceptable theory of capital structure before then. In the perfect capital market, the capital structure does not affect a firm's value. It is the theory of capital structure irrelevance that a firm's value depends on the ability of its assets to create value and is irrelevant if the assets originate in internal capital or external capital. Modigliani and Miller (1963) took taxation under consideration and proposed that firms should employ as much debt as possible. Companies have an advantage in using debt rather than using internal capital, as they can benefit from debt tax shields. This tax shield allows firms to pay lower tax than they should, when using debt capital instead of using only their own capital. The theory argues that the more debt, the more a firm's value is created.

2.2 Trade-off theory

According to Graham and Harvey (2001), Trade-off theory is one of the underpinning theory behind the capital structure of an entity, the decision on what sources of finance to adopt in financing the economic activities of the firm involves a critical economic and financial trade-off. The proportion of internal financing to debt employed by the firm will affect the capital structure and invariably affect the performance of the entity. Hence, if all the sources are available to the

entity, the pros and cons must be considered before taking any critical economic and financial decision. Some scholars believed that it is better to finance an entity economic activity with debt rather than employ equity, the proponent, and followers of this school of thought believed that debt financing give the entity tax shield unlike equity financing.

2.3 The Pecking order theory

This theory stemmed from Myers (1984) who argues that firm will prefer retained earnings to debt, short-term debt over long-term debt and debt over equity. This ranking was motivated with reference to the adverse selection model in Myers and Majluf (1984). The ordering, however, stems from a variety of sources including agency conflicts and taxes. The pecking order theory predicts that firms with more investments holding profitability tax should accumulate more debt over time. The pecking order theory argues that firms prefer internal finance over external funds. Thus, according to the pecking order theory, with investments and dividends taxed, more profitable firms should become less levered over time.

2.4 Agency theory

Jensen and Meckling (1976) states that the governance of a company is based on conflicts of interest between the company's owners (shareholders), its managers and major providers of debt finance. They proposed that there are two kinds of agency costs, namely agency costs of equity and debt. The conflicts between managers and shareholders leads to agency costs of equity. The conflicts between shareholders and debt holders leads to agency costs of debt. To monitor managers and constrain their excesses, shareholders may incur certain costs, called agency costs the theory demonstrates the relationship between shareholders and the agent, such as managers of shareholder funds, (Morri & Beretta, 2008). Lawal at el. (2014) in their study of the effects of capital structure on firm's performance opined that ownership and control of large corporation become more separated due to the ceaseless dilution of equity ownership. Hence because of the dispersed ownership, managers are prone to likely pursue selfish interest instead of the interest of the owners, this moral hazard will lead to monitoring and bonding cost. To minimize agency cost an optimal debt level in capital structure should be maintained to avoid divergent interest of agents with principals and other stakeholders such as debt holders (Jensen and Meckling, 1976).

2.5 Empirical Review

Nazir, Azam and Khalid (2021) investigated the relationship between the listed firms' debt level and performance on the Pakistan Stock Exchange during a five-year period (2013-2017). The study applied pooled ordinary least squares regression, fixed and random-effects models to analyze a cross-sectional sample of 30 Pakistani companies. The results indicate that both short and long-term debt have negative and significant impacts on firm performance in profitability. This suggests that agency issues may lead to a high-debt policy, resulting in lower performance. However, both sales growth and firm size have positive effects on the profitability of non-financial sector companies. This study suggests that company owners and managers should focus on finding a satisfactory debt level.

Kurfi, Yadudu and Sabo (2021) examined the effect of Debt on the performance of Banks in Nigeria. The study adopted an Ex Post Facto Design. Annual reports of the Deposit Money

Banks listed on Nigerian Stock Market were used to find out the debt level of the firms and the Indicators of firm performance. 14 Deposit Money Banks were over a period of 9 years (2010-2018). Data was analyzed using pooled Ordinary Least Square, Fixed Effects and Random Effects regression models to test the various hypotheses. The findings showed long-term debt has a positive significant effect on Return on Equity (ROE), whereas it has no significant effect on return on assets (ROA). The study suggest that firms should use more debt compare to equity in financing their profitable investment opportunities up to the extent that it improves firm's performance.

Abbas, Aziz and Khan (2020) investigates the impact of debt financing on airline's (transport) sector performance of Pakistan. The study employed a data sample of 11 years from 2008-2018 by using 3 transport companies' annual reports. Findings suggest there is an opposite relationship between debt financing and the financial performance of airlines. Debt was measured from three ratios namely, short-term debt to total assets, long-term debt to total assets, and total debt to total assets ratio. Return on assets and earnings per share were measures of performance. The study concluded that companies should focus on retained earnings which is a cheaper source of finance and use less level of debt. As more debt is use by the companies, decreases performance.

Pham and Nguyen (2020) investigate the moderating role of board independence in the relationship between debt financing and the performance of emerging market firms. They used an empirical model in which the firm's accounting profitability was a dependent variable and the independent variables were debt financing and board independence, as well as various control variables. The analysis used panel data set of 300 listed firms in Vietnam between 2013 and 2017. The study finds that debt financing has a significantly negative effect and that board independence reduces the adverse impact of debt financing on accounting profitability. Their results were consistent across different estimation models and methods.

Yusuf and Aleemi (2020) investigated the impact of debt financing on the performance of Pakistan business sector. Leverage ratio of Debt-to-Equity and performance measurements of Return-on-Assets, Return-on-Equity and Tobin's-Q ratio were used as independent and dependent variables. Firm age and size have been controlled for, to improve the reliability of the results. The sample comprises of 50 business firms in Pakistan, listed on the stock exchange from 2013 to 2018. Fixed Effects Regression analysis was used for the balanced panel data. The results show that debt financing has a significantly positive impact on firm performance for manufacturing sector companies, while insignificant for service sector. The paper recommended a feasible proportions of debt and equity when making financing decisions, and for shareholders and creditors to choose whether to make investments in a potential firm.

Aziz and Abbas (2019) examined the association of different debt financing on firm's performance in Pakistan. Secondary data was collected from 14 different sectors in Pakistan Stock Exchange, for a period of 9 years (2006 to 2014). The results indicated that debt financing have negative but also significant impact on firm performance in Pakistan. This study findings recommends that companies should rely more on their internal source of finance because it is the cheap sources of finance in Pakistani.

Pandey and Sahu (2019) empirical enquire into the relationship among debt financing, agency cost and performance of Indian manufacturing firms. The study tries to document the impact of debt financing on firm performance in two different phases of panel data estimations. In the first

phase, the study enquires the effect of debt on firms' profitability measured by return on equity. The second phase tries to empirically explain the reason behind such impact by introducing agency cost. Considering the manufacturing firms traded in the BSE 200 Index from 2009–2016, the study shows a significant and negative effect of debt on firm performance. The magnitude of debt is also found to be positively affecting the agency cost.

Aniefor and Onatuyeh (2019) studied the effect of debt Financing on Corporate Performance among Consumer Goods firms in Nigeria. Sourced data from audited annual reports of fifteen (15) consumer goods firms listed in the Nigerian Stock Exchange (NSE) between 2006 and 2017 Results of panel regression technique revealed that total debt, long-term debt and short-term debt to asset ratios positively influence the performance of consumer goods firms in Nigeria. Based on the findings, they recommended the need for Nigerian firms to rely less on short-term debts, which forms the major part of their leverage, and focus more on developing internal strategies that can help improve their performance.

Oruwari (2018b) assesses how exogenous factors impacted the development of marginal oil field in different emerging economies such as Nigeria, China, India, Indonesia, Malaysia, and Venezuela. The study showed that successful development of marginal oil field depends on the country's developmental stage and institutional framework. The findings summarized that successful development of marginal oil fields anchored on the principle of sustainability. The political, social, economic, legal, and technological issues affecting marginal oil fields should be in line with global best practice.

Öhman and Yazdanfar (2017) empirically investigated the capital structure determinants of SMEs with a particular focus on short and long-term debts. Several methods were used to analyze a sample of 15,897 Swedish SMEs between 2009 and 2012 period. The results indicate that eight explanatory variables namely: size, age, growth, profitability, liquidity, asset tangibility, non-debt tax shields and industry affiliation – are associated to various extents with SMEs debt policy. The study shows that debt policy influences firm performance, value, and survival of SMEs.

Bashiru and Bukar (2016) examined the impact of capital structure on financial performance of listed firms in Nigerian Oil and Gas industry. The study adopted an ex-post facto research design and utilized panel data collected from annual reports and accounts of sampled firms from 2005 to 2014. Results shows capital structure proxied by STD, LTD and TD has negative and significant relationship with financial performance (ROA and EPS) of listed petroleum marketing companies in Nigeria. the result also shows that firm size and tangibility have positive and significant relationship with ROA and EPS.

Nwude and others (2016) provides an empirical investigation of the impact of debt structure on the performance of Nigerian quoted firms. They used 12-year annual panel data from 2001 to 2012, with cross section of 43 firms in different sectorial classifications. The data were collated from the annual reports of the sampled firms and Nigeria Stock Exchange. The study employed three regression estimations (Pooled OLS, Fixed Effects and Random Effects). The outcome Shows that debt structure has negative and significant impact on the performance of Nigerian quoted firms within the study period. The study concludes that debt structure contributes negatively to performance of Nigerian quoted firms, thereby agree with pecking order theory.

Yazdanfar and Öhman (2015) examined the relationship between debt level and performance among small and medium-sized enterprises. They use three-stage least squares (3SLS) and fixed-effects models to analyze cross-sectoral sample of 15,897 Swedish SMEs operating in five industry sectors from 2009 to 2012. The study confirms debt ratios, in terms of trade credit, short-term debt and long-term debt, negatively affect firm performance. SME owners and managers tend to finance their businesses with equity capital to a high degree. The study recommended that SME owners and managers should focus on finding a satisfactory debt level.

Odeleye (2014), studied the Corporate Finance and Efficiency of Indigenous Energy Firms in Nigeria. The research suggested that empirical analysis on the subject could not be carried out due to lack of access to relevant information on economic activities of indigenous firms. The study recommends transparency of local energy firms in Nigeria and the need for oil firms to strengthen their capacity, competence and significantly improve their public image. This will motivate potential investors and enhance access to funds.

Abor (2008) examined the relationship between agency factors and the debt level of Ghanaian SMEs. Generalized least squares model was used to estimate the regression equation. The results indicate that managerial ownership is negatively related to debt level. This suggests that SMEs with insider shareholders may prefer lower leverage to reduce the risk of insolvency. The results also show that SMEs with many shareholders are less likely to employ debt finance. Firms with many shareholders are not likely to entertain the fear of loss of control since the firm is seen as group owned.

3.0 METHODOLOGY

3.1 Sample and source of data

The research covered a period of ten years between 2011 and 2021. The population of study include all nineteen (19) producing Marginal fields in Nigeria as at 2021. Ten (10) Marginal oil fields operated by five (5) companies were sampled for analysis. The major secondary source of data was from annual financial Statement and reports of Marginal field companies as published in Nigeria stock exchange and firm's websites. The study adopted descriptive and ex post facto design.

3.2 Variables

3.2.1 Dependent variables

Accounting-based performance measures present the management actions outcome, hence are preferred over market-based measures when the relationship between corporate governance and firm performance is investigated (Hutchinson & Gull, 2004 and Mashayekhi & Bazazb, 2008). This study used Return on asset (ROA) and Return on Equity (ROE) in line with several studies conducted by (Kurfi, Yadudu & Sabo, 2021; Paymaster & Kpolode, 2021; Yusuf and Aleemi, 2020; Arshad, 2020; Arikekpar, 2020; Aniefor & Onatuyeh, 2019; Vishnu,2019; Vătavu, 2015; Salim and Yadav, 2012).

3.2.2 Independent variables

The two types of debt finance in the financial Statements are long term debts (non-current liabilities) and short-term debts (current liabilities). Interest bearing loans and borrowings from

banks are the major sources of debts in the oil and gas industry. Most large bank loans are syndicated across multiple banks. In previous research variables such as short-term debt and long-term debt was used by (Nazir, Azam & Khalid, 2021; Kurfi, Yadudu & Sabo, 2021; Aniefor & Onatuyeh, 2019; Öhman and Yazdanfar, 2017; Salim and Yadav 2012).

3.2.2 Control Variables

Firm size is usually calculated by taking the logarithm of total assets. In this research, firm size is calculated by taking the logarithm of total assets. In prior studies there is evidence that firm size positively affect performance (Mohammad & Jaafer, 2012 and Aniefor & Onatuyeh, 2019).

3.3 Method of Data Analysis

Two complementary regression techniques were used to analyze the time series cross-sectional data. The first estimation procedure was descriptive statistic, followed by correlation analysis and finally the regression analyzes, namely: Feasible generalized least squares (FGLS) and Panel spatial correlation consistent fixed effects (PSCC-FE) methods. Feasible generalized least squares estimator directly considers heteroskedasticity, cross-sectional and serial correlations in estimation. The Driscoll-Kraay (1998) Panel spatial correlation consistent (PSCC) standard errors fixed effects regression technique corrects the standard errors of the coefficient estimates for possible dependence (Cameron & Trivedi, 2005; Hoechle, 2006). This approach recognizes the individual fixed effects of the cross-sections and further assumes that the explanatory variables are correlated with the error term.

3.4 Model Specification

To determine the relationship between debt finance and performance of indigenous oil and gas companies an empirical model used by previous authors was adopted and modified to suit the objectives of the study, (Demirguc-Kunt & Huizinga, 1999; Simon-Oke & Afolabi, 2011; Salim & Yadav, 2012; Vătavu, 2015; Pacini et al., 2017; Aniefor, 2019; Vishnu, 2019; and Arshad, 2020). The critical assumption of Time Series Cross Sectional models is that of panel, that is, all units are characterized by the same regression equation at all points in time. This assumes that data structure is rectangular, that is, each N units are observed for same T time periods. Given this assumption we can write the functional form of the different performance models as follows:

Return on Asset and debt finance

$$ROA_{it} = \alpha_0 + \alpha_1 lnSZ_{it} + \alpha_2 TAX_{it} + \psi lnLTD_{it} + v_{it} \qquad [1]$$

$$ROA_{it} = \vartheta_0 + \vartheta_1 lnSZ_{it} + \vartheta_2 TAX_{it} + \rho lnSTD_{it} + s_{it} \qquad [2]$$

Return on Equity and debt finance

$$ROE_{it} = \alpha_0 + \alpha_1 lnSZ_{it} + \alpha_2 TAX_{it} + \psi lnLTD_{it} + v_{it} \qquad [3]$$

$$ROE_{it} = \vartheta_0 + \vartheta_1 lnSZ_{it} + \vartheta_2 TAX_{it} + \rho lnSTD_{it} + s_{it} \qquad [4]$$

Where,

ROA_{it} = Marginal oil field companies Return on Assets, over time, t

ROE_{it} = Marginal oil field companies Return on Equity, over time, t

LTD_{it} = Long term Debt
STD_{it} = Short term Debt
TAX_{it} = Taxation (Control Variable)
SZ_{it} = Firm Size (Control Variable)

4.0 DATA ANALYSIS
4.1 Descriptive Statistics

The summary of the descriptive statistics presented in Table 1.2 shows the sample mean for long term and short-term debts are 128,575 and 123,971 respectively. The mean for ROA and ROE is -0.05 and -7.69, respectively. Their respective standard deviations of 19.09 and 61.31 indicate that the companies are greatly dispersed from the sample average. We also observe that ROA and ROE have negative skewness relative to other variables. Marginal field operators used more of LTD compared to STD.

Table 1.2 Descriptive Statistics

Statistics	ROA	ROE	LTD	STD	SZ	TAX
Mean	-0.04896	-7.69717	128574.8	123971.2	407526.8	127.75
Median	1.9	3.156723	48247	41197.27	236546.4	-471.952
Maximum	41.76248	75.12663	585138	522740.7	1422003	67667
Minimum	-111.275	-334	0	248.679	27030.14	-35748
Std. Dev.	19.09203	61.31064	156195.8	145841.4	390430.4	15325.59
Skewness	-3.89577	-3.97133	1.32905	1.254989	0.907041	1.725015
Kurtosis	25.11916	20.05703	3.907011	3.472768	2.705228	10.32528
Jarque-Bera	1122.846	722.8073	16.10501	13.3188	6.896316	131.1248
Probability	0	0	0.000318	0.001282	0.031804	0
Observations	49	49	49	49	49	48

Source: Researcher's Computations

4.2 Correlation Analysis

Table 1.3 present Pearson's Correlation, the relationships between ROA and other variables, only ROE exhibit a positive and significant association at the 1%, level. ROE shows no significant association with all other variables. Noticeably, Size shows strong, positive, and significant correlated with Long-term Debt (LTD) and Short-Term Debt (STD) at 1% level. Short-Term Debt is positive and significantly correlated to Long-Term Debt (LTD) at 1% level.

Table 1.3 Correlation Coefficients

Variables	ROA	ROE	lnLTD	lnSTD	lnSIZE	TAX
ROA	1.000					
ROE	0.679***	1.000				
lnLTD	0.171	-0.063	1.000			
lnSTD	0.026	-0.152	0.870***	1.000		
lnSIZE	0.18	-0.064	0.894***	0.875***	1.000	
TAX	0.038	0.077	0.023	0.272*	0.147	1.000

Note: *** significant at 1% level; ** significant at 5% level; * significant at 10% level
Source: Researcher's Computations

4.3 Regression Results using Feasible Generalized Least Square techniques

Tables 1.4 and 1.5 show results of the relationship between debt finance and firm performance using Feasible Generalized Least Square (FGLS) techniques. Table 1.4 represent Return on asset as performance measure with long term debt (model 1) and short-term debt (model 2). Whereas, Return on Equity (ROE) and independent variables are presented in Table 1.5. Firm size and taxation were employed as control variables in all models.

Table 1.4: FGLS result: Return on Asset (ROA)

Variables	ROA and LTD (Model 1)		ROA and STD (Model 2)	
	Coefficient	z-statistics	Coefficient	z-statistics
lnSIZE	-1.988	-0.367	12.16***	3.65
TAX	0.000111	0.832	0.000195*	1.814
lnLTD	0.316	0.0803		
lnSTD			-7.496***	-3.795
Constant	19.57	0.588	-66.67***	-2.601
Year Dummies	Yes		Yes	
Observations	43		48	
No. of Companies	5		5	
Wald Statistic	8.291		28.3	

Note: *** significant at 1% level; ** significant at 5% level; * significant at 10% level; ln: Natural logarithm
Source: Researcher's Computations

4.3.1 Hypothesis one (ROA and LTD)

H_{01}: There is no significant relationship between Long term debt and Return on Asset of Marginal field operators in Nigeria?

This null hypothesis is tested via model 1

$$ROA_{it} = \alpha_0 + \alpha_1 lnSZ_{it} + \alpha_2 TAX_{it} + \psi lnLTD_{it} + v_{it} \qquad [1]$$

Table 1.3 shows the coefficient of firm size is negative but Tax and LTD are positive. However, they are all statistically not significant. Hence, the size, tax and long-term debt effect on ROA is zero. FGLS reveals that the coefficient of Long-term debt is positive but is not statistically significant. Therefore, we accept the null hypothesis that Long-term debt doesn't have a significant effect on Marginal field performance.

4.3.2 Hypothesis two (ROA and STD)

H_{02}: There is no significant relationship between Short term debt and Return on Asset of Marginal field operators in Nigeria?

This null hypothesis is tested via model 2

$$ROA_{it} = \vartheta_0 + \vartheta_1 lnSZ_{it} + \vartheta_2 TAX_{it} + \rho lnSTD_{it} + s_{it} \qquad [2]$$

The coefficient of Short-term debt is negative, and the relationship is statistically significant at 1% level. A percentage change in STD will cause a decrease in ROA by 7.49 percent, on average, ceteris paribus. That of coefficient of firm size is positive and statistically significant at the 1% level. This implies that a percentage change in firm size will cause a rise in ROA by 12.16 percent, on average, ceteris paribus. The effect from TAX is positive at the 10% level. Hence, a percentage change in TAX will cause an increase in ROA by 0.00019 percent, on average, ceteris paribus. Thus, we accept the null hypothesis that short-term debt doesn't have a significant effect on Return on Asset of Marginal field companies.

Table 1.5: FGLS Result: Return on equity (ROE)

Variables	ROE and LTD (model 3)		ROE and STD (Model 4)	
	Coefficient	z-statistics	Coefficient	z-statistics
lnSIZE	-2.813	-0.153	20.95*	1.901
TAX	0.000208	0.383	0.000366	0.786
lnLTD	1.371	0.111		
lnSTD			-12.63*	-1.706
Constant	18.4	0.163	-118.1	-1.419
Year Dummies	Yes		Yes	
Observations	43		48	
No. of Companies	5		5	
Wald Statistic	4.709		10.07	

Note: *** significant at 1% level; ** significant at 5% level; * significant at 10% level; ln: Natural logarithm

Source: Researcher's Computations

4.3.3 Hypothesis three (ROE and LTD)
H_{03}: There is no significant relationship between Long-term debt and Return on Equity of Marginal field operators in Nigeria?

$$ROE_{it} = \alpha_0 + \alpha_1 lnSZ_{it} + \alpha_2 TAX_{it} + \psi lnLTD_{it} + v_{it} \qquad [3]$$

Table 1.5 reveals positive coefficient on Long term debt and statistically not significant. The effect of Long-term debt on ROE is zero. Thus, we accept the null hypothesis that Long-term debt doesn't have a significant effect on Marginal field Return on Equity. Firm size shows negative relationship with ROE.

4.3.4 Hypothesis four (ROE and STD)
H_{04}: There is no significant relationship between Short-term debt and Return on Equity of Marginal field operators in Nigeria?

$$ROE_{it} = \vartheta_0 + \vartheta_1 lnSZ_{it} + \vartheta_2 TAX_{it} + \rho lnSTD_{it} + s_{it} \qquad [4]$$

The table 1.5 show an inverse relationship with Short term debt and statistically significant at 10% level. A percentage change in it will cause an inverse in ROE by 12.63%. The coefficient of firm size is positive and statistically significant at 10% level. This shows a percentage change in size will cause a rise in ROE by 20.95 %. The effect from Tax is positive but statistically not significant. Thus, we accept the null hypothesis that short-term loan doesn't have a significant effect on Marginal field companies Return on Equity.

4.4 Panel spatial correlation consistent fixed effects (PSCC-FE) method

Tables 1.6 and 1.7 show results with the use of Panel spatial correlation consistent fixed effects (PSCC-FE) technique. A total of four (4) models were estimated. Table 1.6 shows Return on Asset (ROA) and independent variables. While Table 1.7 represent Return on Equity (ROE) and independent variables. Firm size and taxation were used as control variables in all models.

Table 1.6: PSCC-FE Results for Return on Asset (ROA)

Variables	ROA and LTD (Model 1)		ROA and STD (Model 2)	
	Coefficient	t-statistics	Coefficient	t-statistics
lnSIZE	20.01	1.351	25.63*	2.392
TAX	9.11E-05	0.813	0.000136	1.442
lnLTD	-4.311	-1.316		
lnSTD			-10.97*	-2.414
Constant	-190.5	-1.234	-187.9*	-2.34
Year Dummies	Yes		Yes	
Observations	43		48	
No. of Companies	5		5	
F-Statistic	2405		2249	

Note: *** significant at 1% level; ** significant at 5% level; * significant at 10% level; ln: Natural logarithm
Source: Researcher's Computations

4.4.1 Hypothesis one (ROA and LTD)

H_{01}: There is no significant relationship between Long term debt finance and Return on Asset of Marginal field operators in Nigeria?

$$ROA_{it} = \alpha_0 + \alpha_1 lnSZ_{it} + \alpha_2 TAX_{it} + \psi lnLTD_{it} + v_{it} \qquad [1]$$

Table 1.6 reveals Size and Tax have positive coefficients, whereas, Long term debt have a negative coefficient and statistically insignificant relationship with ROA. Therefore, we accept the null hypothesis that Long-term debt doesn't have a significant effect on Marginal Field companies Return on Asset.

4.4.2 Hypothesis two (ROA and STD)

H_{02}: There is no significant relationship between Short term debt and Return on Asset of Marginal field Operators in Nigeria?

$$ROA_{it} = \vartheta_0 + \vartheta_1 lnSZ_{it} + \vartheta_2 TAX_{it} + \rho lnSTD_{it} + s_{it} \qquad [2]$$

The table 1.6 depicts a negative coefficient and statistically significant relationship with short term debt at 10% level. This implies that a percentage change in STD will cause a decrease in ROA by 10.97%, on average, ceteris paribus. The coefficient of firm size is positive and statistically significant at the 10% level. a percentage change in Size will cause a rise in ROA by 25.63%, on average, ceteris paribus. The effect from Tax is zero. Therefore, we accept the null hypothesis that Short-term debt doesn't have a significant effect on Marginal Field Performance.

Table 1.7: PSCC-FE results for Return on Equity (ROE)

Variables	ROE and LTD		ROE and STD	
	Coeff	t-stat	Coeff	t-stat
lnSIZE	32.59	1.017	42.92	1.922
TAX	0.000347	0.706	0.000667	1.169
lnLTD	-25.50*	-2.51		
lnSTD			-19.41	-1.959
Constant	-113.9	-0.315	-298.4	-1.726
Year Dummies	Yes		Yes	
Observations	43		48	
No. of Companies	5		5	
F-Statistic	10870		266.3	

Note: *** significant at 1% level; ** significant at 5% level; * significant at 10% level; ln: Natural logarithm
Source: Researcher's Computations

4.4.3 Hypothesis three (ROE and LTD)

H_{03}: There is no significant relationship between Long-term debt and Return on Equity of Marginal field operators in Nigeria?

$$ROE_{it} = \alpha_0 + \alpha_1 lnSZ_{it} + \alpha_2 TAX_{it} + \psi lnLTD_{it} + v_{it} \qquad [3]$$

Extractions from table 1.7 reveals long term debt has statistically significant and negative effect on ROE at 10% level of significance. It implies that a percentage change in long term debt will cause a decrease in ROE by 25.50%, on average, ceteris paribus. Size and Tax have positive coefficients, not statistically significant. Thus, we accept the null hypothesis that long-term debt doesn't have a significant effect on Marginal Field companies Return on Equity.

4.4.4 Hypothesis four (ROE and STD)

H_{04}: There is no significant relationship between Short-term debt and Return on Equity of Marginal field operators in Nigeria?

$$ROE_{it} = \vartheta_0 + \vartheta_1 lnSZ_{it} + \vartheta_2 TAX_{it} + \rho lnSTD_{it} + s_{it} \qquad [4]$$

Table 1.7 depicts that short-term debt is statistically insignificant and have negative effect on ROE. The coefficients of Size and Tax are positive; however, they are statistically not

significant. Hence, the size, tax and Short-term debt effect on ROE is zero. Thus, we accept the null hypothesis that short-term debt doesn't have a significant effect on Marginal Field companies Return on Equity.

5.0 CONCLUSION

Considerable number of researches examined the relationship between debt finance and firm performance, but very few explored the effect of debt on indigenous oil and gas industry. This research empirically investigated the impact of debt finance on the performance of producing marginal fields in Nigeria from 2011 to 2021. Long term debt (LTD) and short-term debt (STD) were used as independent variables. Firm performance was proxied by two accounting-based measurement, which are Return on Asset (ROA) and Return on Equity (ROE). Data from five companies operating ten marginal fields were extracted from their annual financial statement and reports. Regression techniques were Feasible generalized least square (FGLS) and Panel spatial correlation consistent fixed effects (PSCC-FE).

FGLS regression result depicts a positive, but not statistically significant relationship between LTD and ROA/ROE. Short term debt is negative and have significant relationship with performance. PSCC-FE regression method also showed similar result, that both long term debt and short-term debt have inverse and significant relationship with performance (ROA/ROE) of Marginal fields in Nigeria. However, firm size has positive impact on firm performance. This suggests that organization high debt policy may lead to lower performance

The finding shows that debt finance negatively affects firm performance and this collaborate results of (Nazir, Azam & Khalid, 2021; Kurfi, Yadudu & Sabo, 2021; Öhman and Yazdanfar, 2017; Yazdanfar and Ohman, 2015; Salim & Yadav 2012; Zetun & Tian, 2007; and Abor, 2007). The findings are also consistent with Pecking order theory by Myers and Majluf (1984). However, there are contrary views from other research by (Yusuf and Aleemi, 2020; Aniefor & Onatuyeh, 2019) who suggested that there is a positive relationship between firm performance and capital structure choice.

The study recommends that owners and managers of marginal fields to strategize toward achieving an optimal capital structure by increasing debt level and reduce dependence on shareholder equity. One major strategy of debt mobilization channel is through syndicated loans from multiple local and foreign banks. Such loans have longer maturity and lower interest rate, increase performance of Marginal fields. The study further recommends deliberate efforts by the Federal Government through the Central bank of Nigeria to enact monetary policy that will lower interest rates for marginal field operators to enhance access to debt finance from commercial banks. This is in line with recommendation by Akinwale and Akinbami (2016).

This research focusses on enhancing the existing empirical knowledge of debt financing's influence on the development of marginal oil fields in Nigeria. This study is limited to Producing Marginal fields, future studies can address a wider range of indigenous companies in Nigeria and apply new variables or other accounting-based measures.

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