



Research Paper

## Asset Structure, Capital Structure and Performance of Quoted Industrial Goods Firms in Nigeria

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### ABSTRACT

This study examined the effect of asset structure and capital structure on the performance of quoted industrial goods firms in Nigeria within 2011-2019. The study was structured into two models with property, plant, and equipment (PPE), other fixed assets (OFA), and current assets (CAS) as explanatory variables for the asset structure model; long term debt to total equity (LTDTEQ), long term debt to total asset (LTDITAS), long term debt to long term capital (LTDITLC) as explanatory variables for the capital structure model while performance was represented in each model by return on asset (ROA). Data were sourced from the companies' annual statements of financial position and statements of profit and loss. The study employed descriptive statistics, correlational and panel data as methods of data analysis. Findings showed that while all the asset structure variables had a positive but insignificant effect, capital structure variables viz; ratio of long term debt to total equity, ratio of long term debt to total asset each had positive and significant effect and ratio of long term debt to total long term capital had an inverse and significant effect on return on assets of industrial goods firms in Nigeria. The study therefore concluded that while asset structure does not meaningfully affect the performance of industrial goods firms, capital structure has a positive effect. The study encouraged the firms to consider acquiring more long term debts to finance their operations and avoid investing too much on fixed assets.

**KEYWORDS:** Asset structure, Total Asset, Capital structure, Total equity, Return on Asset

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### I. INTRODUCTION

As a going concern with the desire to continue running sustainably, every firm strives to meet up with the general short term objective of profit maximization, and the long term objective of maximizing the wealth of the share holders at the minimal cost possible. To achieve these objectives, asset structure and capital structure of the firm are two factors that have gained prominence in corporate finance literature and therefore, have been the subjects of discussion in this study.

According to [1] asset structure refers to all resources and assets owned by the company which are used in its operations and are expected to provide future benefits. Also [2] and [3] view asset structure from a similar perspective. They describe asset structure as components of fixed assets consisting of Property, Plant and Equipment; intangible assets; long term investments and funds; as well as all current assets including cash in hand and in the bank. Studies have shown that the type of assets acquired by a firm in terms of long term fixed assets (property, plant, and equipment) short term fixed assets, and current assets has ramifications as a firm pursues its short term and long term objectives afore stated. For instance [1]; [4] showed that asset structure has a positive and significant influence to earnings.

Meanwhile ZhengSheng and NuoZhi in [4] are of the opinion that the research of assets structure is of more practical value and universal relevance than capital structure since they are the main source of corporate value creation and with risk avoided. In this regard, the asset structure of a firm has to be designed with close attention, and with the attainment of the main objective of the firm at the centre. This notwithstanding, every business whether a start-up or an existing one employs and uses capital. The capital is usually split into long-term capital and short term also called working capital. This leads us to introduce the other factor that firm performance has been demonstrated by extant studies to hinge on. These studies contend

that the pattern in which a firm finances its assets through a combination of equity and long term liabilities – what is known in the corporate finance parlance as Capital Structure is determinant of the firm's performance [4]; [5]; [6]. In the past couple of decades, the theory of capital structure and leverage; the impact of capital structure on firms' performance has not only been a subject of heated debate, it is arguably an area of finance theory that has attracted the greatest attention and ignited the highest controversy [7]. The pace setters of the debate were [8] whose capital structure model under a perfect and efficient market caught a lot of attention and instigated a considerable debate in corporate finance literature. In the model, it is argued that under certain conditions, the choice between debt and equity does not really matter as it does not affect firm value – implying that the value of a corporation and its costs of capital are unaffected by its capital structure and the only variable that determines firm value is its future earnings power (expected cash flow) and consequently, the capital structure decision is irrelevant. Adding steam to the already boiling debate was the interjection of a related theory by Jensen and Meckling - the agency cost theory which refers to the potential conflict between managers and shareholders in one hand, and between shareholders and debtors in the other hand [9]. It is worthy to note that there are two main ways of raising capital used to finance the assets of a firm. Firm owners could decide to employ only equity and use this for the acquisition of the firm's fixed asset and part for working capital. A firm could also decide to raise capital through external funding in the form of debt, both long term and short term debt and use same to acquire both fixed asset and for working capital. Irrespective of the source of financing, there is a cost of funds. The simple reason that cost is associated with acquired funds presupposes that care must be taken in taking decisions on the choice of type of funds, or the capital- mix to be employed in running the business and bearing in mind the aspirations of the owners and the financiers.

According to [10], a firm which does not have enough internal capital and which lacks what it takes to obtain external funding is usually a victim of financial setbacks. Being that funding plays such an important role in every business set-up, funding policy of a firm becomes a crucial issue to finance managers, and the ratio of equity to debt a determining factor for optimum performance. For this reason, the firm's management needs to carefully set a capital structure that will enable the firm achieve this objective. An optimum capital structure is the one which maximizes the stock price. If the debt to equity ratio is very high, it increases the financial risk of the firm and scares away potential investors.

Studies in testing the effect of capital structure on firm performance have had inconsistent results. Studies done by, [4]; [5]; [6] showed that capital structure has a positive and significant influence on firm's performance. These are contrary with the result of studies by [1]; [9]; [11]; [12] which found that capital structure measured by long term debt to total assets and total debt to total assets has a significant negative impact on firm performance.

Result of [13] showed that capital structure (long term debt, retained earnings and external equity) did not have a significant effect on firm performance (insignificant /negative relationship with ROA but insignificant positive relationship with ROE).

There are 12 industrial goods companies registered under the manufacturing sector of the Nigerian stock exchange. These companies specialize in the production of building materials, electronic and electrical Products, packaging/containers, as well as tools and Machinery. Despite the ever increasing demand for their products, about a third of the companies are still struggling to survive with at least a quarter reporting negative returns in the past five consecutive years. Consequent to the important role this industry plays in building the economy through various ways (taxes, employment, infrastructure); since enough attention has not been paid to the sector by researchers; based on the relevance of asset structure and capital structure to a firm; following the inconsistent results on the effect of capital structure on firm performance; this two modeled study sought to investigate the effect of asset structure as well as capital structure on firm performance in quoted industrial goods firms in Nigeria.

Asset structure is measured in the study as the ratio of property, plant, and equipment to Total Assets, the ratio of other Assets to Total Assets, the ratio of Current Assets to Total Assets whereas capital structure is measured as Debt to Asset Ratio (DAR), Long term Debt to Equity Ratio (LTDER), Long term debt to Long term capital ratio, and firm performance is represented by return on assets (ROA). The study is divided into five sections. Section I is the introduction, section II is review of related literature, section III is the methodology, section IV is data presentation and analysis, section V is conclusion and recommendations.

## **II. REVIEW OF RELATED LITERATURE**

### **2.1 CONCEPTUAL REVIEW**

#### **Assets Structure**

There are three different opinions about what constitutes asset structure. According to [1] and corroborated by [10], assets structure represents the balance, or the ratio between fixed assets and total assets; it is the structure of assets in terms of how much fund is allocated in each component of assets both in fixed assets

as well as in current assets; it is the wealth or economic resources owned by the company which is expected to provide benefits in the future and made up of fixed assets, intangible assets, and current assets. Asset structure shows the amount of funds allocation in each part of assets. This is important, since it is related to the amount of funds needed for the firm long-term's goal, which will determine the investors' perception towards the firm [10]. In other words, it is the balance of current and fixed asset and shows the collateral value of assets. It portrays the amount of assets that can be used as collateral to the creditor. The proxy of asset structure is measured by comparing the amount of the fixed assets as well as other assets to Total asset.

## **Capital Structure**

Capital Structure has been variedly defined. However, the various definitions all point to the kind of securities and their proportionate amounts that makeup capitalization. In this regard, capital structure is the mix of different sources of long-term funds such as equity shares, preference shares, debentures, long-term loans and retained earnings [7]. In furtherance to this, [7] also opined that the study of capital structure attempts to give meaning to the mix of securities as well as financing sources used by corporations to finance real investment which keep the business going, and at the same time spurring growth. A number of options are usually available for the firm to finance these investments. For instance, the firms can opt for internal finance sources such as retained earnings and issuing shares for public. The firm could decide to use external finance sources such as loans or bonds. This explains why [14] define capital structure simply as the permanent financing of the company that is usually presented principally by long-term debt and equity.

Deciding the appropriate long term capital mix of a firm is vital as this is very much connected with the value of the firm. In this perspective, the optimal mix - what constitutes the best possible combination of long term debt and equity is the fundamental purpose of capital structure. It is understandable that the actual level mix of a firm's permanent long-term financing constituting debt, preferred stock, and common stock equity could vary fairly over time since the majority of firms strive to keep their financing mix close to the targeted optimal mix for the firm.

A firm's capital structure decision invariably takes account of a target by taking cognizance of the mean tenor of its debt and the specific types of financing it may choose to use in a foreseeable future. Just as with operating decisions, it is expected that managers make capital structure decisions that will lead to maximization of the firm's intrinsic value.

Reviewing the definitions we made, capital structure therefore, could well be stated as the mixing of long term financial sources to finance the firms' operations. Financial sources can include equity capital only; preference capital only; debt only; a mix of equity and debt capital; a mix of debt and preference capital; a mix of equity and preference capital; or a mix of equity, preference and debt capital in different proportions used by the firm.

## **2.2 Theoretical Framework**

This work is anchored on both the [15] signaling theory and the Trade-off Theory of [16]. The signalling theory is the idea that one party credibly conveys some information about itself to another party. In this regard, the firm will send a good signal to investors by adding fixed assets that may be used as collateral thus giving the company easy access to debt should need arises. Asset structure invariably indicates funds allocation in each part of assets. This is essential, since it is not only associated to the actual funds needed for the firm long-term's plan, it will in the near future determine the investors' perception towards the firm. The firm will send a good signal to investors by adding fixed assets that may be used as collateral for more debt should the need arise (signaling theory). It follows therefore, that companies with higher collateral value of assets (asset structure) have greater access to bank loans compared to the firms dominated by intangible assets due to the reduced risk level of investments and transactions involving assets, which are easily disposable on the market [2]. This study borrows from this perspective and makes assumption that these assets are pledged as collateral, and thus the firm with high level of tangible asset can easily access debts, without being forced by situation to issue equity. In this perspective, a study, [17] showed a positive relation between asset structure with firm performance. In another argument, [18] opined that liquidation value of fixed asset is usually higher than intangible asset, implying that when a firm goes bankrupt, it is less risky for the investors. In a similar vein, [19] stated that a large tangible asset will determine firm's capability in giving bigger collateral. Therefore, there is an effect of asset structure on firm value.

Although pace setters of the debate on effect of capital structure on firm value were [8] who argued that when market is perfect and there is no impact of taxes, then firm's capital structure decision is unrelated to a firm's

value, opponents of the theory argue that some of the fundamental assumptions of the theory seem unrealistic in real life. For, instance the theory fails to hold when the rigid propositions imposed are relaxed implying at this juncture that firm's capital structure actually matter to firm's value. Therefore, the trade-off theory was introduced by [16]. It suggests that a company chooses how much debt finance and how much equity finance to use by balancing the costs and benefits (trade-off). It was then expanded by Myers in 1984, who pointed out the tax benefits of debt and the costs of financial distress consisting of bankruptcy costs of debt and non-bankruptcy costs [20]. It is mostly for these tax advantages that aggressive Companies like to issue debt. Apart from interest payments tax shield, debt enables a firm to retain ownership; unlike equity where ownership could be diluted. Furthermore, it is asserted that debt is usually available and easy to access when interest rates are low.

### **2.3 Empirical Studies**

A adopting Partial Least Squares method of analysis, [1] conducted a study on Influence of Asset Structure and Capital Structure on performance of listed Banks in Indonesia within the scope 2012-2015. Return on Assets (ROA) and Return on Equity (ROE) were used as the dependent variables for the different models in the study. For the asset structure models, they used, Ratio of Current Assets to Total Assets, Ratio of Fixed Assets to Total Assets, Other Assets Ratio to Total Assets as independent variables while Debt to Asset Ratio (DAR), Debt to Equity Ratio (DER), and Capital Adequacy Ratio (CAR) were used to capture capital structure. Findings of the study showed that asset structure has a positive and significant influence to earnings, while capital structure has a negative and significant influence on earnings.

Meanwhile [12] examined the effect of capital structure on firm performance in Vietnam within the period 2007-2012 using panel regression. The study used ROA, ROE, and Tobin Q as the dependent variables representing firm performance, while book leverage and market leverage were used to represent capital structure, the independent variable. Findings showed that both book leverage and market leverage have negative relation with firm performance.

Also, [5] carried out a study on capital structure and financial performance in Nigeria within the period 2005 -2012 using ordinary least squares analysis. The study represented the dependent variable with interest before tax and the independent variables with equity and long term debt. Findings of the study showed that both equity and long term debt have a positive and significant effect on interest before tax.

In a similar vein, [4] examined the effect of asset structure on financial performance of firms quoted under commercial and services Sector at the Nairobi Securities Exchange, Kenya within the period 2010 – 2014. By employing the simple regression method, ROA, EPS, ROE were in each case, regressed with Property, Plant and Equipment, Current assets, Intangible assets, and Long term investment and funds. The result showed that while Property, Plants and Equipment, long-term investments and funds have a statistically significant effect on financial performance, current assets and intangible assets did not have a statistical significance on financial performance.

A study by [9] investigated the impact of capital structure on Financial Performance of in Istanbul stock exchange, Turkey within the period 2005-2012 using multivariate regression analysis. It was a three model study with Return on Asset (ROA), Return on Equity (ROE) and Earning per Share (EPS) as dependent variables respectively each representing firm performance. Capital structure was captured as Debt Ratio (DR), and represented the independent variable for each of the models. The result showed that there is a negative significant relationship between capital structure and firm performance in Istanbul stock exchange.

In Omam, [21] worked on Assets Structure and the Financial Performance within the scope 2008-2012 using content analysis. The result revealed that asset structure did not have a strong effect on profitability when measured as ROE, fixed assets had an impact on ROE but not ROA, while unlike ROA asset structure had an impact on ROE and only in petro-chemical sector.

In Indonesia, [10] employed panel regression to study the effect of asset structure and firm size on firm value spanning 2010-2014 while using capital structure as the intervening variable. Ratio of Market equity to book equity was used to represent firm value while ratios of long term capital to total equity, fixed asset to total asset, and book value of total asset were all employed as measures of capital structure. From the result, while there was a direct effect of asset structure on the firm value; there was no direct effect of firm size on firm value and even with capital structure as intervening variable, there was neither an indirect effect of asset structure nor indirect effect of firm size on the firm value.



In Nigeria, [6] researched on capital Structured and firm performance of non-financial Firms in Nigeria within the time scope 2011 - 2015 using Panel regression analysis. The dependent variable, performance, was proxied by ROA and ROE, while the ratio of short term debt to total asset (STDTA) ,total debt to total equity (TD/TE), long-term debt to total asset (LTDTA) while firm size was represented by the natural log of total asset. Findings showed that the ratio of short term debt to total asset (STDTA) and total debt to total equity (TD/TE) had significant inverse effect on ROA; short-term debt to total asset (STDTA) and long-term debt to total asset (LTDTA) had significant positive effect on ROE; total debt to total equity (TD/TE) had significant negative effect., while firm size had significant positive effect in both models.

A study, [22] examined the determinants of capital structure in Nigerian banking sector within the period 2006-2010 using pooled ordinary Least Square method. Leverage ratios were used to represent capital structure as the dependent variable while size, dividend payout, profitability, tangibility, liquidity, growth, and tax charge were used as proxies for various determinants and represented the independent variables. Findings of the study showed that bank size, dividend payout, profitability, tangible assets, growth, business risk and tax charge are determinants of capital structure of banks in Nigeria

Equally, [11] explored the impact of capital structure on firms' performance in Nigeria within the time scope 2000-2010 by regressing returns on investment (ROI), the dependent variable with leverage, inflation, GDP as independent variables using Pooled and mixed effect estimation technique. The result of the study showed a significant negative relationship was established between leverage and performance.

[13] used Feasible Generalized Least Squares method, random and fixed effects based on Hausman specification tests to probe the relationship between financial structure and financial performance of Firms Listed at East Africa Securities Exchanges covering 2005 - 2007. Performance was represented in the study by ROA and ROE , while capital structure was represented by short term debt, long term debt, retained earnings, and external equity. Findings of the study revealed that short term debt, long term debt, retained earnings and external equity had insignificant /negative relationship with ROA but insignificant positive relationship with ROE . Also, combined financial structure had a significant positive/ negative relationship with return on equity and return on assets respectively.

The Australian financial sector was the focus when [23] worked on capital structure and firm performance in the sector with data spanning 2005-2007 and using OLS to regress profit efficiency measure (PEFF) - return on equity (ROE) with the ratio Equity/Total assets (ECAP) and Loans/Total assets (L/A). The result showed that at relatively low levels of leverage, a linear relationship exists between debt and profit efficiency resulting to higher bank performance, while an inverse effect occurred at relatively high levels of leverage in Australian financial sector.

The result was somewhat similar when [24] examined Capital Structure and Firm Performance in Nigeria from 1998 - 2012 using two step generalized method of moments (GMM) for analysis. It indicated quite clearly that performance is enhanced with moderate debt financing and decreased with too much debt financing.

In Srilankan, [25] used pooled panel data regression to examine Capital structure and firm performance in Srilankan firms during 2002-2008 period. As performance indicators, they used Return on Assets (ROA) and Tobin Q (TQ), and as capital structure indicators, they used total debt to total assets ratio (TD/TA), total debt to total equity ratio (TD/TE) and short term debt to total assets ratio (STD/TA). Findings showed that firm performance is inversely affected by the use of debt capital.

Meanwhile [26] investigated if capital structure impact firm performance in USA by studying three sectors in the country within the period 2004 – 2013 using simple regression analysis. As performance measures, they used Market Value per Share, Return on Assets, Operating Return, and Profit Margin, and as capital structure indicators, they used long-term liabilities to total assets ratio. The result showed that in all the three sectors, Capital structure had a negative relationship with return on assets and operating return and that it positively affects profit margin in the Industrial Sector, negatively affects profit margin in the Energy Sector, and no relationship in the Healthcare Sector. There was equally no relationship between capital structure and stock prices in all three sectors.

[27] carried out an Analysis of Capital Structure and Firm's Financial Performance in a Developing Country, specifically in Bangladesh within 2013-2017 by employing descriptive statistics, correlation, and pooled ordinary least square analysis. return on equity, return on asset, and earnings per share were used as measures of performance while debt ratio (DR), equity ratio (ER), long-term debt ratio (LTDR), short-term debt ratio (STDR) were used as measures of capital structure. Findings of the study showed that debt and equity

ratio uniformly impact on the ROA while debt and equity ratio did not have significant impact on ROE and EPS as financial performance indicators.

### III. METHODOLOGY

The study is basically quantitative and ex-post facto research design was adopted to investigate the effect of asset and capital structures on the performance of quoted industrial goods firms in Nigeria. The design type is dictated by the fact that the variables on asset and capital structures have already been documented by firms under investigation. The study is based on secondary data sourced from 7 of the industrial goods companies' profit and loss reports and their statements of financial positions gotten from their annual reports covering 2011 to 2019 as only 7 companies had workable data. Such reports can be sourced from <http://www.nse.com.ng/Listings-site/listed-securities/listed-companies>. The dataset was structured into a panel since cross-section and time series are included. Panel data is structured to measure different variables for entities (individuals) over a certain time period.

According to [28], structuring data in panels allows more complicated datasets to be tested and analyzed while deriving the following advantages:

Controlling for individual heterogeneity; more information in the data set, more flexibility, less risk of collinearity between variables; easier to study - dynamics of adjustment; easier to create and test more advanced models. The afore-listed features of panel data make it more suitable for this study.

#### Model Specification

The present is a two-model study with model specifications guided by, adopted and adapted from prior studies of [28] and [1] with the necessary modifications to suit the topic. [28] examined capital structure and corporate performance of Nigerian quoted firms using the ratio of total debt to total assets (TD/TA); the ratio of long term debt to total assets (LTD/TA); and the ratio of short term debt to total assets (STD/TA) as the independent variables against return on asset (ROA) as one of the dependent variables (  $ROA = f(TD/TA, LTD/TA, STD/TA)$  ) while [1] used ratio of current assets to total assets; ratio of fixed assets to total assets; and other assets ratio to total assets to represent the asset structure in his study of asset structure, capital structure, risk management and good corporate governance on financial performance and value of the firm (  $ROA = f(CA/TA, FA/TA, OA/TA)$  ). The models of these prior studies have been modified to reflect the objectives of the present study and stated in two models. Model one investigates the effect of asset structure on firm performance while model II investigates the effect of capital structure on firm performance. They are stated thus:

#### Model I

$$ROA = f(PPE, OFA, CAS)$$

The econometric equation of model I becomes:

$$ROA = \beta_0 + \beta_1 PPE + \beta_2 OFA + \beta_3 CAS + \mu$$

Where

ROA is return on asset, PPE is ratio of property, plant, and equipment to total asset, OFA is ratio of other fixed asset to total asset, CAS is the ratio of current assets to total asset  $\beta_0$  is the intercept of the model,  $\beta_1$  and  $\beta_2$ , and  $\beta_3$  are coefficients of the stated variables, and  $\mu$  is the error term.

#### Model II

$$ROA = f(LTDTEQ, LTDTAS, LTDLTC)$$

The econometric equation of model II becomes:

$$ROA = A_0 + A_1 LTDTEQ + A_2 LTDTAS + A_3 LTDLTC + \varepsilon$$

Where

LTDTEQ is ratio of long term debt to total equity, LTDTAS is ratio of long term debt to total asset, LTDLTC is ratio of long term debt to total long term capital,  $A_0$  is the value of ROA not affected by changes in the explanatory variables,  $A_1$ - $A_3$  are coefficients of the respective explanatory variables, and  $\varepsilon$  is the error term.

## II. RESULTS AND DISCUSSION

### Descriptive Statistics

Table 1 is a summary statistics for the variables used in the study. Table 1 examined with scrutiny, provides a lot of relevant information. The average return to assets (ROA) for the sample as a whole was 7.91%. The maximum ROA within the period was 110% while the minimum was -14.16% with standard deviation from the mean value of 16.08%. The implication is that while a good number of industrial goods

firms enjoyed high return on Asset, some others suffered losses by deviating so much from the mean. In the second, third, and fourth columns of the table, are the ratios of property, plant, and equipment (PPE), other fixed assets to total assets (OFA) and the ratio of Current asset to Total asset (CAs) respectively. Other assets include intangible assets as well as long term investments and funds. These ratios measure the asset structures of the firms. It can be observed that industrial goods firms within the period invested more on fixed assets compared to current assets with a mean of PPE of 49.65% and OFA of 13.87% making a total of 63.52 % of total asset while CAS made up 36.84% of the total asset. Column 5 of Table 1 shows the ratio of long term debt to total equity (LTDTEQ). This ratio is one of the proxies for capital structure and measures the long term solvency of the firms. It is a financial and liquidity measure that shows the percentage of the firm's financing that comes from creditors and investors. The low mean value of LTDTEQ of 21.73% shows that in average industrial good firms in Nigeria would be able to meet up with their financial obligations as they become due. The low LTDTEQ ratio also showed that industrial firms in Nigeria are not highly leveraged and hence, financially stable. The ratio of long term debt to total asset (LTDTAS) in percentage is 8.14%. This is very low compared to the appropriate bench mark of about 50% or less [29]. This is good news to the industrial firms as the ratio shows the percentage of assets a firm would have to liquidate to pay-off its long term debts. The ratio of long term debt to long term capital (LTDLTC) is another measure of capital structure. It is also simply called long term debt ratio and relates the long term debt of the firm to the long term capital. The long term capital include equity funds and long term debt capital. A mean of LTDLTC of 13.22% showed that the long term solvency of industrial firms in Nigeria is assured and the leverage risk is minimal. The minimum values of LTDTEQ, LTDTAS, LTDLTC of zero showed that there were some industrial firms with zero long term debt, implying that their operations were financed entirely by equity funds and short term debts.

**Table 1 Descriptive Statistics for the Explained and the Explanatory Variables (2011 – 2019)**

	ROA	PPE	OFA	CAS	LTDTEQ	LTDTAS	LTDLTC
Mean	7.913651	49.65	13.87	36.84	21.73222	8.141905	13.22254
Median	6.530000	45.33	8.46	26.50	8.490000	5.840000	7.830000
Maximum	110.7100	86.90	62.52	92.44	152.2700	35.39000	60.36000
Minimum	-14.16	7.	0.00	3.20	0.000000	0.000000	0.000000
Std. Dev.	16.08137	21.93	16.17	23.90	36.54694	8.703315	16.14711
Skewness	4.169405	0.20	1.56	0.43	2.475641	1.276060	1.701086
Kurtosis	27.68560	1.79	4.55	1.79	8.236240	3.893977	5.02145
Jarque-Bera	1782.150	4.26	31.88	5.79	136.3251	19.73550	41.19202
Probability	0.000000	0.12	0.00	0.06	0.000000	0.000052	0.000000
Sum	498.5600	3127.75	873.96	2321.18	1369.130	512.9400	833.0200
Sum Sq. Dev.	16033.85	29829.04	16214.46	35421.13	82812.08	4696.357	16165.21

Source: Authors' computation using Eviews 10.0

**Correlation of the Variable**

Table 2 showed negative relationship between return on asset (ROA) and property, plant, and asset as well as with current asset respectively. However, the correlation between ROA and other asset is positive.. The correlation matrix of capital structure variables is presented in Table 3. It showed that ROA has a negative correlation with LTDTEQ and LDLTC, but a positive correlation with LTDTAS. The low correlation ratio between the variables in the models is an indication that the models may not suffer from multicollinearity problems hence good for analysis

**Table 2 Correlation ROA and Asset Structure Variables**

	ROA	PPE	OFA	CAS
ROA	1.00	-0.16	0.42	-0.12
PPE	-0.16	1.00	-0.22	-0.76

OFA	0.42	-0.22	1.00	-0.46
CAS	-0.12	-0.76	-0.46	1.00

Source: Authors’ computation using Eviews 10.0

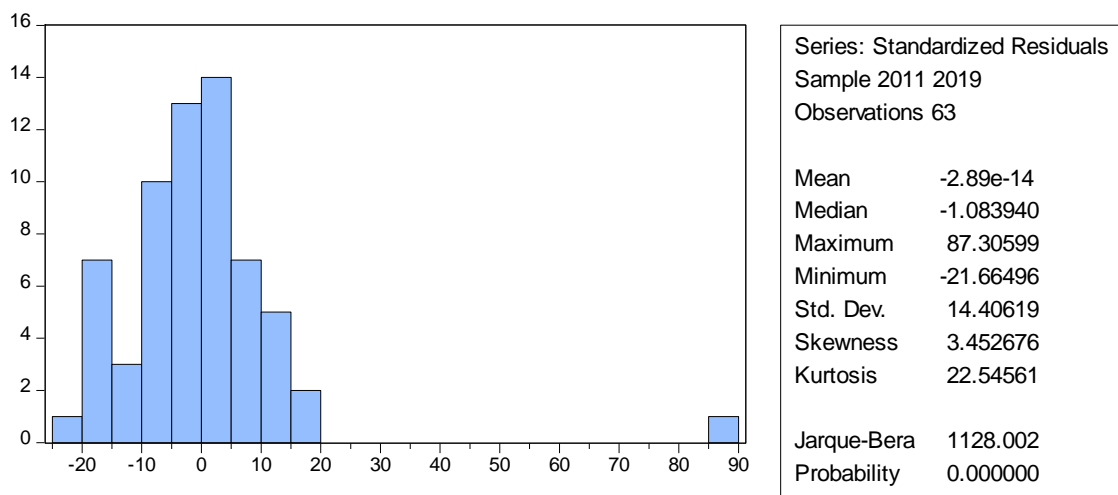
**Table 3 Correlation ROA and Capital Structure Variables**

	ROA	LTDTEQ	LTDTAS	LTDLTC
ROA	1	-0.21957	0.108375	-0.23882
LTDTEQ	-0.21957	1	0.817298	0.970652
LTDTAS	0.108375	0.817298	1	0.875265
LTDLTC	-0.23882	0.970652	0.875265	1

In general however, the descriptive statistics and correlation analysis do not necessarily establish a causal relationship between the explanatory and the explained variables irrespective of the magnitude of the coefficients. They only specify the association link between variables. This necessitates the use of more rigorous and advanced econometric techniques to adequately capture definite significant relationship between the firm performance measure and the explanatory variables. In this perspective, the use of Panel data analysis, both the fixed and the random effects was employed for coefficients estimation and analysis.

**Normality Tests**

Another preliminary test that was conducted to investigate the robustness, suitability and use of findings for inferences after regressing the models was the normality test. This measures the spread of the dataset around the mean of the Gaussian curve. Normality test results for model I and model II are presented in Figure 1 and Figure 2 respectively.



**Figure 1. Normality test result for asset structure (model I)**

Source: Authors’ computation using Eviews 10.0

The Null hypothesis for the normality test is H0: Data is normally distributed. From Fig. 4 the probability of Jarque-Bera statistic for asset structure model is  $0.0000 < 0.05$ , therefore the Null hypothesis of normal distribution is rejected. This implies that the data is not normally distributed and therefore the findings cannot be used for inferences. In contrast, in Fig. 2 which shows the normality test result for the capital structure model, the probability of Jarque-Bera statistic is  $0.258330 > 0.05$  implying that the Null hypothesis of normal distribution cannot be rejected. This implies that data for model II – the capital structure model is normally distributed hence findings for this model can be used for inferences.



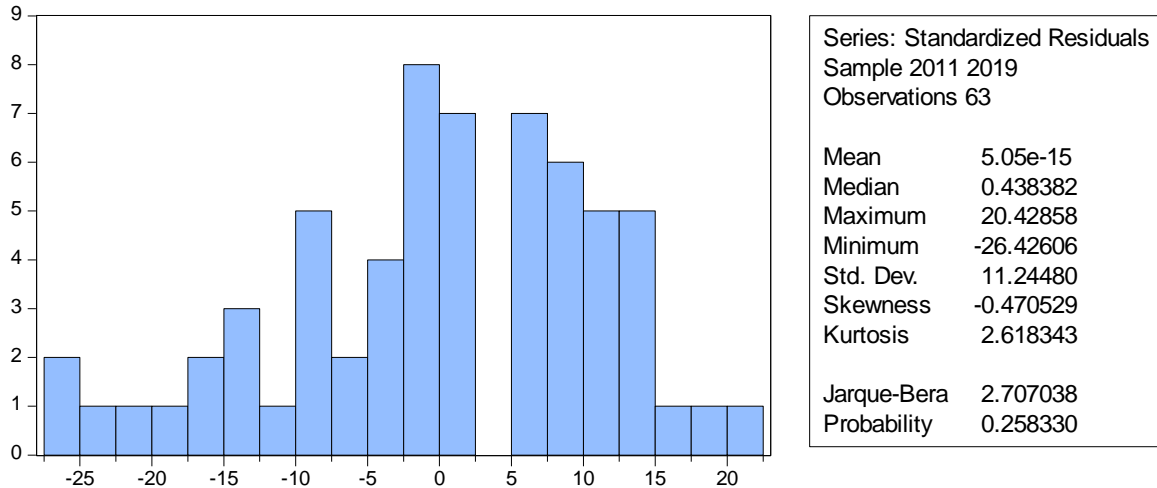


Figure 2 Normality Test result for Capital structure (model II)

Source: Out put from Eviews 10.0 after author’scomputation

**Panel Regression Results**

Despite low R-squared and adjusted R-squared as observed in Table 5 for model1 which relates asset structure and firm performance, the result of the correlated random Effects – Hausman test in Table 4 showed that random effect is a consistent model for analysis of result. The Null hypothesis for the Hausman test is H0: Random effects is a consistent model for analysis. From the result in Table 4, the probability of the Chi-Sq. Statistic is 0.5797 > 0.05 implying that we cannot reject the null hypothesis that random effect is a consistent model for analysis. Therefore the estimated coefficients used to analyze model I are captured in the random effect panel regression in Table 5.

**Table 4 Hausman Test for Model I**

Correlated Random Effects - Hausman Test  
Equation: Untitled  
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	1.964823	3	0.5797

Source: Out put from Eviews 10.0 after author’scomputation

**Table 5: Random Effect Estimation Results for Asset Structure Variables (Model 1)**

Dependent Variable: ROA  
Method: Panel EGLS (Cross-section random effects)  
Date: 01/03/21 Time: 15:34  
Sample: 2011 2019  
Periods included: 9  
Cross-sections included: 7  
Total panel (balanced) observations: 63  
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
PPE	0.916349	0.948535	0.966067	0.3380
OFA	1.298763	0.961977	1.350098	0.1821
CAS	0.947739	0.957677	0.989623	0.3264
C	-90.51572	95.52214	-0.947589	0.3472

Effects Specification		S.D.	Rho
Cross-section random		4.919019	0.1054

Idiosyncratic random		14.33266	0.8946
Weighted Statistics			
R-squared	0.129769	Mean dependent var	5.513571
Adjusted R-squared	0.085520	S.D. dependent var	14.85579
S.E. of regression	14.20637	Sum squared resid	11907.43
F-statistic	2.932686	Durbin-Watson stat	1.880397
Prob(F-statistic)	0.040768		
Unweighted Statistics			
R-squared	0.197487	Mean dependent var	7.913651
Sum squared resid	12867.37	Durbin-Watson stat	1.740115

**Source: Computed by author using Eviews 10.0**

The result in Table 5 showed that R-squared and adjusted R-Squared are 0.129769 and 0.085520 respectively. This showed that approximately just 9% of the changes in return on asset (ROA) of industrial goods firms in Nigeria can be explained by the changes in their plant, property and equipment, other fixed assets, and current asset ratios to total assets, while about 91% are explained by other factors not included in the model. The Durbin-Watson stat of 1.88 is just around the bench mark of 2 showing that the data did not suffer from autocorrelation problems. The F-statistic of 2.932686 and its probability of 0.040768 showed that the model is a good fit and is significant at 5% level of significance and therefore suitable for further analysis.

The coefficients of plant, property, and equipment (PPE); other fixed assets (OFA), and current assets (CAS) of 0.916349, 1.298763 and 0.947739 and their respective probabilities of 0.3380, 0.1821, and 0.3264 imply that all the measures of asset structure in this study each has a positive but insignificant effect on return on asset (ROA) of industrial goods in Nigeria for the period covered by the study. This is consistent with [21] in Omam who found that ratio of fixed asset to total asset had no impact on return on asset. However, [4] in Kenya showed that asset structure has a positive and significant effect on ROA while [10] in Indonesia equally revealed a direct effect of asset structure on firm value.

For Model II, the result of the correlated random Effects – Hausman test in Table 6 also showed that random effect is a consistent model for analysis of result. The Null hypothesis for the Hausman test is H0: Random effects is a consistent model for analysis. From the result in Table 8, the probability of the Chi-Sq. Statistic is 0.7043 > 0.05 implying that we cannot reject the null hypothesis that random effect is a consistent model for analysis. Therefore the estimated coefficients used to analyze model II are captured in the random effect panel regression in Table 7.

**Table 6 Hausman Test for Model II**

Correlated Random Effects - Hausman Test  
Equation: Untitled  
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	1.405087	3	0.7043

**Source: Out put from Eviews 10.0 after author’s computation**

**Table 7: Random Effect Estimation Results for Capital Structure Variables (Model II)**

Dependent Variable: ROA  
 Method: Panel EGLS (Cross-section random effects)  
 Date: 12/30/20 Time: 10:24  
 Sample: 2011 2019  
 Periods included: 9  
 Cross-sections included: 7  
 Total panel (balanced) observations: 63  
 Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LTDTEQ	0.401339	0.122077	3.287587	0.0017
LTDTAS	3.399869	0.295055	11.52283	0.0000
LTDLTC	-2.791742	0.312113	-8.944650	0.0000
C	8.424166	4.431847	1.900825	0.0622

Effects Specification		S.D.	Rho
Cross-section random		10.90866	0.6822
Idiosyncratic random		7.445841	0.3178

Weighted Statistics			
R-squared	0.727762	Mean dependent var	1.755652
Adjusted R-squared	0.713919	S.D. dependent var	13.73152
S.E. of regression	7.344512	Sum squared resid	3182.570
F-statistic	52.57404	Durbin-Watson stat	1.579722
Prob(F-statistic)	0.000000		

**Source: Out put from Eviews 10.0 after author's computation**

In Table 7, R-squared and adjusted R-squared of 0.727762 and 0.713919 was an indication that about 71 % changes in the ratios of long term debt to total equity (LTDTEQ), long term debt to total asset (LTDTAS), long term debt to long term capital (LTDLTC) are responsible for the changes in return on assets (ROA) of industrial goods in Nigeria covering the period 2011-2019. The rest of 29 % changes are explained by factors other than those in the model. In addition, the

F-statistic of 52.57404 and its probability of 0.000000 showed that model II has a good fit and is significant. Furthermore, the Durbin-Watson stat of 1.579722 approximately 1.6 did not deviate significantly from the benchmark of 2 implying that the variables did not suffer from autocorrelation. This also added to the robustness of the model.

The ratios of long term debt to total equity (LTDTEQ), long term debt to total asset (LTDTAS), long term debt to long term capital (LTDLTC) are 0.401339, 3.399869, and -2.791742 respectively and their corresponding probabilities are 0.0017, 0.0017, 0.0000, and 0.0000 respectively. This showed that while long term debt to total equity (LTDTEQ), long term debt to total asset (LTDTAS) have a positive and significant effect, long term debt to long term capital (LTDLTC) has an inverse and significant effect on return on assets of industrial goods firms in Nigeria within the period covered by the study. Specifically, a unit increase in long term debt to total equity (LTDTEQ) will led to a 0.40 mean increase in Return on asset (ROA) and a unit increase in long term debt to total asset (LTDTAS) will lead to a 3.4 mean increase in ROA while a unit increase in long term debt to long term capital (LTDLTC) will result to a 2.8 mean decrease in ROA of industrial goods firms in Nigeria within the period covered by the study. Equally, while [6] showed that ratio of LTDTA and LTDTEQ of Nigerian firms had significant positive effect and significant negative effect respectively, [25] showed that firm performance is negatively affected by the use of debt capital in Sriranka; [27] demonstrated that debt and equity ratio uniformly impact on the ROA in Bangladesh; [26] showed that Capital structure had a negative relationship with return on assets in USA. In a similar vein, [1] in Indonesia, [12] in Vietnam; [9] in Istanbul stock exchange, Turkey showed that capital structure negatively impacted ROA. [4] and [5] showed that capital structure has a positive and significant influence on firm's performance.

### III. CONCLUSION

The study concluded that asset structure has no effect while capital structure positively and significantly favored the performance of Nigerian industrial good firms and encouraged the firms to consider acquiring more long term debts to finance their operations and avoid investing too much in fixed assets. This notwithstanding, the study suggested that more research still has to be conducted especially on asset structure and firm performance, taking other performance measure like Return on Equity (ROE) and Tobin's Q into consideration. This will add in solving the problem of paucity of research in this area.

## REFERENCES

- [1]. Ukhriyawati, C. F., Ratnawati, T., & Riyadi, F. (2017). The influence of asset structure, capital structure, risk management and good corporate governance on financial performance and value of the firm through earnings and free cash flow as an intervening variable in banking companies listed in Indonesia stock exchange. *International Journal of Business and Management*, 12(8),249-260.
- [2]. Koralun-Bereznicka, J. (2013). How Does Asset Structure Correlate with Capital Structure? – Cross-Industry and Cross-Size Analysis of the EU Countries. *Universal Journal of Accounting and Finance*, 1(1), 19 – 28.
- [3]. Schmidt M. (2014) *Business Case Essentials*. 4th Edition: Solution Matrix Limited. Ebook.
- [4]. Mwaniki, G & Omagwa, J (2017). Asset structure and financial performance: a case of firms quoted under commercial and services sector at the Nairobi securities exchange, Kenya. *Research Journal of Finance and Accounting*, 8(4), 102-110.
- [5]. Adesina, J.B., Nwidobie, B. M., & Adesina, O. O. (2015). Capital structure and financial performance in Nigeria. *Int J.Bus Soc Res* 5, 21-31.
- [6]. Akingunola, R. O., Olawale, L. S., & Olaniyan, J. D. (2017). Capital Structure Decision and Firm Performance: Evidence from Non-Financial Firms in Nigeria, *Economica*, 13(6), 351-364.
- [7]. Aljamaan, B. E. (2018). Capital structure: definitions, determinants, theories and link with performance literature review. *European Journal of Accounting, Auditing and Finance Research*, 6(2), 49-72.
- [8]. Modigliani, F., & Miller, M. H. (1958). The cost of capital, corporation finance and the theory of investment. *The American*, 1, 3.
- [9]. Nassar, S. (2016) The impact of capital structure on Financial Performance of the firms: Evidence From Borsa Istanbul. *Journal of Business and Financial Affairs*, 5, 173-179.
- [10]. Setiadharna S, Machali M (2017) The Effect of Asset Structure and Firm Size on Firm Value with Capital Structure as Intervening Variable. *Journal of Business and Financial Affairs*, 6 (4), 298-302.
- [11]. Le, T. P. & Phan, T.B. (2017). Capital structure and firm performance: empirical evidence from a small transition country. *Res Int Bus Finance*, 42, 710–726.
- [12]. Muchiri, M. J., Muturi, W. M.,& Ngumi, P. M. (2016). Relationship between Financial Structure and Financial Performance of Firms Listed at East Africa Securities Exchanges, *Journal of Emerging Issues in Economics, Finance and Banking (JEIEFB)*, 5(1), 1734- 1755.
- [13]. Paramasivan, C. & Subramanian, T. (2009). *Financial Management*. New Delhi: New Age International Pvt. Ltd.
- [14]. Spense, M. (1973). Job market signalling, *The Quarterly Journal of Economics*, 355-374.
- [15]. Kraus, A., &Litzenberger, R. H. (1973). A state-preference model of optimal financial leverage. *The Journal of Finance*, 28(4), 911-922.
- [16]. Delcoure N (2006) The Determinants of Capital Structure in Transitional Economies. *International Review of Economic and Finance*, 16, 400-415.
- [17]. Gaud, P., Jani, E, Hoesli M, Bender, A (2003) The Capital Structure of Swiss Companies: An Empirical Analysis Using Dynamic Panel Data. *European Financial Management*, 11(1), 51-69.
- [18]. Alipour, M., Mohammadi, M. F., & Derakhshan, H. (2015). Determinants of capital structure: An empirical study of firms in Iran. *International Journal of Law and Management*,57: 53-83.
- [19]. Ayot, K. O. (2013). Capital structure of listed firms in Kenya: The case of non financial firms. Ph.D Diss., University of Nairobi
- [20]. Al- Ani, M. K. (2014). Effects of Assets Structure on the Financial Performance: Evidence From Sultanate of Oman. *Journal of US-China Public Administration*, 11(2), 170-179.
- [21]. Aremu, M. A., Ekpo, I. C., Mustapha, A. M. & Adedoyin, S. I (2013). Determinants of Capital Structure in Nigerian Banking Sector. *International Journal of Academic Research in Economics and Management Sciences*, 2(4), 27-43.
- [22]. Skopljak. V. (2012). Capital Structure and Firm Performance in the Financial Sector: Evidence from Australia, *Asian Journal of Finance & Accounting*, 4(1), 278-299
- [23]. Yinusa, O. G., Adelopo, I., Rodionova, Y., Samuel, O. L. (2019). Capital Structure and Firm Performance in Nigeria. *African Journal of Economic Review*, 7(1), 31-56.
- [24]. Manawaduge, A., Zoysa,A., Chowdhury, K., & Chandarakumara, A. (2011). Capital structure and firm performance in emerging economies: An empirical analysis of Srilankan firms. *Corporate Ownership & Control*, 8(4), 253-263.
- [25]. Cole, C., Yan, Y., & Hemley, D. (2015). Does capital structure impact firm performance: An empirical study of three U.S. sectors. *Journal of Accounting and Finance*, 15(6), 57-65.
- [26]. Hossain, A., Khan, A. A., & Khalid, M. S. (2019). An empirical analysis of capital structure and firm's financial performance in a developing country. *Global Journal of Management and Business Research*, 19(3), 8-16.
- [27]. El-Chaarani, H. & El-Abiad, z. (2019). Analysis of capital structure and performance of banking sector in Middle East countries. *International Journal of Economics and Financial Issues*, 9(2), 1-11.
- [28]. Olokoyo, F. O. (2012). Capital structure and corporate performance of Nigerian quoted firms: A panel data approach. PhD Thesis, Covenant University, Nigeria.
- [29]. Nzotta, S. M. (2018). Dynamics of bank lending and credit management. Owerri: Treasure books, Skillmark Media Ltd.