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Determinants of the Capital Structure of Nigerian Listed firms: A Dynamic Panel Model

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Abstract--- *Firms in developing countries face high transaction costs and information asymmetric due to the undeveloped capital market conditions. This situation makes it difficult for the firms operating in the region to make a timely adjustment to the optimal leverage to enhance their value. Thus, the firms have to incur costs in their attempt to converge to their target debt ratio. Given this, it is imperative to examine the capital structure determinants using the dynamic model from the perspective of a developing country such as Nigeria. Therefore, this study examines the determinants of the capital structure of the Nigerian non-financial listed firms. The sample size of this research comprised of the 71 firms listed on the floor of the Nigerian Stock Exchange during the year 2012 to 2018. The data for the study was obtained from the annual reports and accounts of the sampled companies and analysed using the Generalised Method of Moments (GMM) estimator. The results of the study suggest that the Nigerian listed firms make a dynamic adjustment to attain optimal leverage ratio. Also, the research suggests that firm size, tangibility, liquidity and return on assets explain the attainment of target leverage of the Nigerian listed firms. The evidence that emerged from this research has a policy implication on the part of managers and investors in making their informed decisions. Managers should strive to operate at the optimum debt-equity level by taking adjustment costs into account when setting their capital structure.*

Keywords--- *Capital Structure, Nigerian Listed Firms, Dynamic Panel.*

I. INTRODUCTION

Designing an optimum capital structure is among the fundamental decisions that firms have to tackle to optimise their value (Ardalan, 2017). The capital structure decision is important because of its effect on the cost of capital and profitability of firms. According to Myers (2001), the mixture of financing sources used by a firm to finance its investment is referred to as capital structure. Similarly, Abor and Biekpe (2009) argue that capital structure is the combination of equity and debt capital that a firm employ to finance its assets. Firms have the latitude in choosing more of equity, short-term debt or long-term debt and other financing options in designing their capital structure. Hence, the ultimate goal of capital structure decisions is for firms to employ appropriate debt-equity level that will ensure sustainability and maximisation of their value (Abor, 2007).

The seminal effort of Modigliani and Miller (1958) provided a substantial boost to the development of capital structure theories, such as pecking order theory, agency theory and trade-off theory. Modigliani and Miller (1958) propounded the capital structure irrelevance theory, where the authors concluded that debt-equity choice does not affect the value of firms. As a result of widespread criticisms of the capital structure irrelevance proposition due to its unrealistic assumptions, Modigliani and Miller (1963) demonstrated the advantage of leverage in influencing the

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value of firms. The pecking order theory states that given the relative information costs attached to the external funding, firms should focus on the internally generated funds in financing their investment opportunities (Myers, 1984). According to Jensen (1986) and Jensen and Meckling (1976), free cash flow and the agency conflicts between shareholders and debtholders may explain the variation of leverage across firms. The trade-off theory is of two versions, the static and dynamic approach. The static trade-off model is of the view that interest tax shield benefit accrues to firms as a result of debt financing (Modigliani & Miller, 1963). This is because interest on borrowing is an allowance deduction in the computation of the corporate tax liability.

On the other hand, the dynamic trade-off model argues that firms have a target or optimum debt-equity ratio that maximise their value. The target point is where the costs and benefits of leverage are equal (Kraus & Litzenberger, 1973). Thus, the deviation from the optimum level reduces the value of firms. However, market frictions such as capital market shocks, information asymmetric and other constraints force firms to deviate from the target capital structure (Baker & Wurgler, 2002; Flannery & Rangan, 2006). Consequently, firms have to incur adjustment costs to revert to the optimum leverage point. In this regard, the dynamic model concludes that firms rebalance their capital structure gradually due to adjustment costs (Basu, 2015; Leary & Roberts, 2005). The speed at which firms adjust their leverage depends on the costs and benefits of the adjustment. That is, the lower the cost, the higher the rate of convergence to the optimum point and vice versa. Accordingly, firms have to trade-off the cost of their adjustment and the cost of being off-target (Ozkan, 2001).

The country's institutional features and the level of financial market development are essential factors that determine the capital structure of firms (Agarwal and Mohtadi, 2004). Given this, the adjustment speed may differ across firms due to different economic conditions. Firms operating in the developing countries face high transaction costs and information asymmetric, thereby constraining their ability to secure external funding to finance their investments.

The existence of adjustment costs due to market frictions makes the capital structure decisions to be dynamic (Haron, 2016; Ramjee & Gwatidzo, 2012). Hence, it is imperative to examine the capital structure determinants using the dynamic model from the perspective of the developing country such as Nigeria. In this regard, only a few studies by Ahmad and Fatima (2017) and Oino and Ukaegbu (2015) applied such dynamic modelling in the Nigerian context. Therefore, this study contributes to the ongoing arguments on the capital structure dynamics in the Nigerian corporate environment. The empirical finding of this study indicates that the Nigerian listed firms make dynamic adjustment annually at the rate of 34.27%, 37.96% and 29.24% to the optimum short-term, long-term and total debt ratio respectively. Also, the research suggests that firm size, tangibility, liquidity and return on assets explain the attainment of target leverage of the Nigerian listed firms.

The paper is structured as follows. Section two focuses on the review of the literature on the subject matter, while section three describes the methodology employed by this research. The subsequent part presents and discusses the empirical results obtained by this study. Finally, the last section contains a summary of the findings and conclusion.

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II. LITERATURE REVIEW

There is a growing literature on capital structure dynamics as a result of the short-coming of the static capital structure models, which stated that observe leverage and optimal leverage of a firm are the same. Thus, the static model does not account for the dynamic adjustment in the capital structure choice of firms. However, a stream of literature has established the exitance of optimum debt level and firms seek to attain the optimum point to maximise their value (Flannery & Rangan, 2006). According to Jalilvand and Harris (1984), the speed of adjustment to the optimum debt ratio is influenced by firm-level attributes. In this context, many studies provided evidence on the effect of firm size on target leverage. Based on the prediction of the trade-off theory, larger firms are relatively more diversified, have stable cash flows and less vulnerable to liquidation (Titman & Wessels, 1988). Thus, firm size and leverage are positively related. Empirical evidence by Ghose, (2017), He and Kyaw (2018) and Fitzgerald and Ryan (2019) found a significant positive relationship between firm size and total debt. Similarly, Ramjee and Gwatidzo (2012) and Chipeta and Deressa (2016) argued that firm size and long-term debt are positively related.

The asset structure of firms also influences their capital structure choice. Firms with a substantial investment in fixed assets are in a better position to provide collateral to secure debt. Also, in the event of liquidation, tangible assets are relatively more stable (Frank & Goyal, 2009). Firms with more tangible assets have lower agency costs associated with underinvestment and assets substitution problem (Jensen & Meckling, 1976). Thus, firms with a higher proportion of fixed assets employ more leverage. Studies indicated a significant positive relationship between tangibility and total debt as a proxy for capital structure (see, Ramjee and Gwatidzo, 2012; Ahmad and Fatima, 2017). Moreover, findings by Lemma and Negash (2013) and Basu (2015) showed a positive association between tangibility and long-term debt. On the contrary, Handoo and Sharma (2014) and Matias and Serrasqueiro (2017) suggested that tangibility has a negative impact on short-term debt.

Capital structure theories documented a contradictory view on the effect of profitability on capital structure decisions. Due to the tax advantage of leverage, trade-off theory argued that profitability level increases as firms employ more debt (Modigliani & Miller, 1963). Empirical findings by Lemma and Negash (2013), Chipeta and Deressa (2016) reported a significant positive association between profitability and both short-term and long-term debts, while Fitzgerald and Ryan (2019) found that profitability and total debt are positively related. On the contrary, the pecking order theory suggested that there are costs attached to the external funds, in this way, profitable firms focus on retaining on retained earnings in financing their investment opportunities (Myers, 1984; Myers & Majluf, 1984). Thus, consistent with the prediction of the pecking order theory, some empirical evidence showed a significant negative relationship between profitability and total debt ratio (Basu, 2015; Ghose, 2017; Haron, 2016).

Furthermore, the growth prospect of a firm is another attribute that can influence its financing decision. According to Myers (1977), growth opportunities are call options, and their value depends on future discretionary investment. In this regard, firms with high growth prospects are perceived by prospective lenders to have high information asymmetric. Thus, lenders may not be willing to supply their funds to firms with higher growth opportunity due to high information asymmetric. Accordingly, studies conducted by Ozkan (2001), Ahmad and Fatima (2017) and Fitzgerald and Ryan (2019) indicated that growth opportunity is negatively related to the

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proportion of debt in the capital structure of a firm. However, companies with low growth investment opportunities and high free cash flow are bound to have high leverage to constraint managers from self-interest behaviour (Jensen, 1986). In this context, empirical evidence by Al-Najjar and Hussainey (2011), Handoo and Sharma (2014) documented a significant positive relationship between growth opportunity and long-term debt. In contrast, Chipeta and Deressa (2016) argued that growth has a positive effect on both long-term and total debts.

The existing literature documented mixed evidence on the impact of liquidity on the debt-equity choice of firms. The trade-off theory argued that firms with substantial liquidity level can withstand the commitment of repaying the principal amount and interest as at when due (Ozkan, 2001). In this way, highly liquid firms tend to have high debt capacity. Studies found a positive relationship between liquidity and total debt (Abdulla, 2017; Al-Najjar, 2011; Basu, 2015). However, Consistent with the prediction of the pecking order theory, Sheikh and Wang (2012) stated that firms with higher liquidity levels might meet up their financial obligations. Thus, they rely more on internal sources in preference to securing an external debt. Therefore, the liquidity ratio is expected to be negatively related to the proportion of leverage. Studies by Haron (2016) and Chakrabarti and Chakrabarti (2019) found a significant negative relationship between liquidity and total debts, while Pacheco and Tavares (2017) argued that liquidity has a negative effect on short term debt.

III. METHODOLOGY

The sample size of this research comprised of the 71 non-financial listed firms that have been listed on the floor of the Nigerian Stock Exchange during the year 2012 to 2018. The data for the study was obtained from the annual reports and accounts of the sampled companies. Firms that disclosed either short-term or long-term debt in their financial statements were purposely selected to achieve the objective of the research. The sampled firms cut across ten sectors such as agriculture, conglomerates, construction, consumer goods, health care, information and communication, industrial goods, non-financial service, oil and gas and natural resources. Moreover, financial firms were excluded because they are subjected to regulatory control, and thus, their financial structure appears to be different from that of non-financial companies (Rajan & Zingales, 1995).

The results produced by static estimators may likely be biased and inconsistent due to the possible correlation between unobserved fixed effect and firm-level attributes. Thus, to estimate the determinants of the capital structure of the Nigerian listed firms using a dynamic approach, this study employed a two-step system Generalised Method of Moment estimator (GMM). The use of this technique will enable us to investigate the effect of adjustment costs as well as the rate of convergence of the sampled firms to the target leverage. The study adopted the partial adjustment model used by Ozkan (2001) with some modification to suits the nature of this research. The model is given as:

$$Y_{it} = \lambda y_{it-1} + \beta X_{it} + \mu_i + \mu_t + \varepsilon_{it} \qquad (1)$$

Where Y_{it} represents the dependent variable in the model for firm i in t time, y_{it-1} is the lagged dependent variable, λ is the adjustment parameter, which is a coefficient value that lies between 0 and 1, the speed of adjustment is given as (1-λ), X_{it} is the vector of independent variables in the model, μ_i is the unobserved firm

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effect, μ_t is the time effects and the error term is denoted as ε_{it}. By substituting the study variables into the equation (1), the following models are specified as follows:

$$STD_{it} = (\lambda - 1)STD_{\mathrm{it}-1} + \beta_1 \mathrm{FS}_{\mathrm{it}} + \beta_2 TANG_{\mathrm{it}} + \beta_3 ROA_{\mathrm{it}} + \beta_4 GROWTH_{\mathrm{it}} + \beta_5 LIQ_{\mathrm{it}} + \mu_i + \mu_t + \varepsilon_{it} \quad (2)$$

$$LTD_{it} = (\lambda - 1)LTD_{\mathrm{it}-1} + \beta_1 \mathrm{FS}_{\mathrm{it}} + \beta_2 TANG_{\mathrm{it}} + \beta_3 ROA_{\mathrm{it}} + \beta_4 GROWTH_{\mathrm{it}} + \beta_5 LIQ_{\mathrm{it}} + \mu_i + \mu_t + \varepsilon_{it} \quad (3)$$

$$TD_{it} = (\lambda - 1)TD_{\mathrm{it}-1} + \beta_1 \mathrm{FS}_{\mathrm{it}} + \beta_2 TANG_{\mathrm{it}} + \beta_3 ROA_{\mathrm{it}} + \beta_4 GROWTH_{\mathrm{it}} + \beta_5 LIQ_{\mathrm{it}} + \mu_i + \mu_t + \varepsilon_{it} \quad (4)$$

Where STD represents the short-term debt, LTD is the long-term debt, TD is the total debt short-term debt, FS is the firm size, TANG is the asset tangibility, ROA is the return on assets, GROWTH is the growth opportunity, LIQ is the liquidity ratio and $\beta_1 - \beta_5$ are the regression coefficients.

IV. EMPIRICAL RESULTS

Table I below shows a summary of the descriptive statistics of the study variables used in this research. The variable STDTA measures the ratio of short-term debt to total assets. The mean value of STDTA is 0.1484, thereby indicating that short-term debts approximately represents 15% of the total assets of the firms. This evidence demonstrates the fact that Nigerian listed firms largely depend on short-term borrowings in the funding of their operations because of the difficulty in accessing a long-term loan from financial institutions. Also, the ratio of long-term debt to total assets (LTDTA) stands on average at 0.0848, while the total debt ratio (TDTA) exhibits a mean value of 0.2332. This shows that about 23% of total assets are financed by debt capital. Firm size determined as the logarithm assets has a mean of 10.110 and showing a little dispersion across the firms. Tangibility exhibits a mean of 0.4187, thereby suggesting that on the average tangible assets represent 42% of the total assets of the sampled firms. The profitability of the firms measured by return on assets (ROA) reveals an average of 6.42% with a minimum and maximum values of -0.3100 and 0.2840, respectively. The statistics suggest that the average growth rate in sales of 3.46%. The liquidity ratio (LIQ) indicates a wide dispersion across the firms by showing a minimum and maximum of 0.065 and 2.881.

Table I: Descriptive Statistics

Variable	Mean	Std. Div.	Minimum	Maximum	Observations
STDTA	0.1484	0.1619	0.0000	0.8160	497
LTDTA	0.0848	0.1221	0.0000	0.7970	497
TDTA	0.2332	0.1967	0.0000	0.8490	497
FIRM SIZE	10.1110	0.7850	8.4190	11.9170	497
TANG	0.4187	0.2414	0.0160	0.8780	497
ROA	0.0642	0.1087	-0.3100	0.2840	497
GROWTH	0.0346	0.4066	-0.9620	0.8930	497
LIQ	1.1817	0.6380	0.0650	2.8810	497

Source: Generated by the author using Stata 15.1

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Table II: Correlation Matrix

Variable	STDTA	LTDTA	TDTA	FIRM SIZE	TANG	ROA	GROWTH	LIQ
STDTA	1.0000							
LTDTA	-0.0616	1.0000						
TDTA	0.7847***	0.5703***	1.0000					
FIRM SIZE	0.0311	0.0150	0.0357	1.0000				
TANG	-0.0561	0.3695***	0.1836***	-0.2234***	1.0000			
ROA	-0.2127***	-0.1537***	-0.2704***	0.2162***	-0.1660***	1.0000		
GROWTH	0.0153	0.0859	0.0660	-0.0540	0.0375	0.0065	1.0000	
LIQ	-0.3819***	-0.1604***	-0.4141***	-0.0734	-0.4006***	0.2048***	-0.0621	1.0000
*** indicates significance at 1% level								

A correlation matrix of the variables is presented in Table II to ascertain the degree of multi-collinearity among the independent variables. According to the correlation results, the short-term debt ratio has a negative and significant correlation with the return on assets and liquidity. Long-term debt and total debt indicate a positive association with tangibility and a negative relationship with return on assets and liquidity. Also, firm size has a strong positive correlation with return on assets and a negative link with tangibility. Tangibility demonstrates a significant negative correlation with return on assets and liquidity ratio. The results show that the return on assets has a significant positive association with liquidity. Consequently, the magnitude of the correlation coefficients suggests that multi-collinearity problem does not exist in the models specified by this research.

Table III: Two-Step System GMM Regression Results (Robust Standard Errors)

Regressors	STD (2)	LTD (3)	TD (4)
STD$it\text{-}_1$	0.6573*** (0.000)	-	-
LTD$it\text{-}_1$	-	0.6204*** (0.000)	-
TD$it\text{-}_1$	-	-	0.7076*** (0.000)
Firm Size	-0.0026 (0.756)	0.0132** (0.019)	0.0124 (0.124)
Tangibility	-0.0894*** (0.002)	0.0829*** (0.009)	-0.0025 (0.930)
Return on Assets	-0.1391* (0.050)	-0.0810* (0.067)	-0.221*** (0.004)
Growth	-0.0080 (0.367)	0.0128 (0.345)	0.0084 (0.609)
Liquidity	-0.0499*** (0.000)	0.0153 (0.117)	-0.0323*** (0.005)
AR2 (P-value)	0.456	0.446	0.135
Hansen test (P-value)	0.263	0.256	0.225
Wald statistics	0.000	0.000	0.000
Diff in Hansen test	0.594	0.809	0.563
Year dummies	yes	yes	Yes
***, ** and * indicate significance at 1%, 5% and 10% level respectively. Numbers in parenthesis are standard errors robust to heteroscedasticity.			

Table III presents the GMM regression results on the determinants of the capital structure choice of the Nigerian listed firms covering the period 2012-2018. Based on the results, the P-value of the Hansen test and AR2 indicate the validity of the instrument sets used in the GMM estimation and also the second-order serial correlation problem

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is absent in our specification. Similarly, the instruments used by the GMM are strictly exogenous and robust as revealed by the p-value of the difference in the Hansen test. According to the estimations, the lagged short-term, long-term and total debts are statistically significant at 1% level. This empirical finding confirms that the Nigerian listed firms adjust their capital structure at an annual rate of 34.27%, 37.96% and 29.24% to attain an optimum short-term, long-term and total leverage respectively. Given these adjustment speeds, it is evident the Nigerian listed firms face high adjustment costs, and as such, the firms move slowly in reverting to their target debt ratio.

Moreover, the results in Table III show that the relationship between firm size and long-term debt is positive and significant at 5% level. This result is in line with the argument of Titman and Wessels (1988)) that because of the fixed transaction costs attached to the issue of new debt, larger firms who relatively issue a sizeable number of stocks would find it cheaper to raise long-term debt through the capital market. Again, this evidence supports earlier finding by Ramjee and Gwatidzo (2012) and Chipeta and Deressa (2016) that larger firms are associated with substantial long-term leverage in their capital structure. The empirical evidence in this study indicates a significant negative relationship between tangibility and short-term debt at 1% significance level. Also, the results suggest that tangibility has a significant positive effect on long-term leverage. This negative impact of tangibility on short-term debt find by this study aligns with the empirical evidence by Handoo and Sharma (2014) and Matias and Serrasqueiro (2017) who suggested that firms with a lower proportion of tangible assets focus more on short-term borrowing in funding their capital structure. On the other hand, the positive relationship between tangibility and long-term debt support findings by Lemma and Negash (2013) and Basu (2015) who emphasized on the importance of tangible assets in accessing a long-term debt. Another possible explanation for this result is that in the event of liquidation, the value of fixed assets is relatively more stable. Consequently, credit providers will be more willing to extend their funds on a long-term basis to firms with substantial investment in fixed assets.

The empirical results from all the model specifications in this research suggests a negative and significant relationship between profitability and short-term, long-term and total debts. This finding lends support to the argument of the pecking order theory that profitable firms rebalance their capital structure with more of retained earnings given the relative information costs associated with the external funding (Myers, 1984; Myers & Majluf, 1984). Given this, the evidence obtained by this study is consistent with the results shown by Basu (2015), Haron (2016) and Ghose (2017) who concluded that leverage decreases as profitability level of firms increases. According to the regression results in this research, liquidity exhibits a negative impact on short-term and total debts at 1% level of significance. This finding conforms with that of Pacheco and Tavares (2017) and Chakrabarti and Chakrabarti (2019). A possible explanation for this result is that firms with a higher liquidity level are associated with lower leverage. More often, these firms focus more on the internally generated funds rather than securing an external debt. Thus, leading to a negative relationship between liquidity and leverage.

V. SUMMARY AND CONCLUSION

This study examined the speed of adjustment of the Nigerian listed firms to the optimal capital structure as well as the determinants of their target leverage ratio. The empirical analysis covers a balanced panel data set of 71 firms listed on the Nigerian Stock Market for seven years (2012-2018). The study specified a dynamic panel model and

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utilised the two-step system GMM estimation technique. The results of the study indicated that the sampled firms make a dynamic adjustment to attain an optimum debt-equity level that maximises their value. The firms converge to their target leverage slowly due to high adjustment costs. Moreover, finding from this study showed that larger firms with a higher proportion of tangible assets employ more long-term debt in reverting to their target capital structure. Also, the empirical evidence suggested that profitable firms with higher liquidity level are associated with lower leverage in their capital structure composition. In sum, the findings of this research appear to be in tandem with the existing literature, which states that capital structure choice influences the value of firms.

The evidence that emerged from this research has an important policy implication on the part of managers of firms and investors in making their informed decisions. Managers of firms should strive to operate at the optimum debt-equity level by taking adjustment costs into account when setting their capital structure. Likewise, the suppliers of funds when making their investment decisions should recognise the dynamism of capital market conditions because of its impact on the risk and return of their investments. Although this study contributes to the growing body of literature on capital structure dynamics, its findings cannot be generalised to the firms in the financial sector, because the scope of this research is limited to the non-financial firms. Another limitation is that the study measured capital structure using only the book value of leverage. Given this short-comings, further research should be undertaken to build on the limitations of this research with the view to validating its findings.

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