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The impact of profitability on capital structure and speed of adjustment: An empirical examination of selected firms in Nigerian Stock Exchange

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ABSTRACT

The aim of the study was to investigate the impacts of capital structure on the performance of Nigerian listed non-financial firms and how these firms adjust to the target capital structure. We tested the Trade-off theory and the pecking order theory and the relevance of these theories to Nigerian firms is confirmed. The speed of adjustment to the target capital structure is determined using both pool OLS and GMM to ensure the robustness of the finding. The descriptive statistics show that leverage constitute 63% of the capital structure of Nigerian firms, while leverage is dominated with the short term leverage. We observed that profitability and asset structure were negatively related to leverage while the size of the firm and non-debt tax shield were positively related to leverage. The adjustment speed of Nigerian firms is very high 47% that compares well with studies on non-financial firms done in most developed countries.

1. Introduction

Capital structure puzzle continues to attract many scholars and policy makers, especially in regard to financial institutions. Capital structure is the permutation of equity and debt which is used to derive

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the cost of capital. Firms, regardless of the industry or sector aim to reduce the cost of capital. This is because the cost of capital can influence the acceptability of the investment or project and the performance of the firm overall. Among the many the many scholars are, Graham and Harvey (2001) and Cotei et al. (2011). In addition, Salawu (2007), Salawu and Agboola (2008) and Akinyomi and Olagunju (2013) conducted their studies in Nigeria examining the determinants of capital structure but devoid the speed of adjustment to equilibrium. The objective of this study is to attempts filling the gap by not only re-examining the determinants of capital structure in Nigeria and how the choice of capital could affect the performance of the firm but also the speed of adjustment.

The rest of the paper is structured as follows. Section 2 examines the literature on capital structure. Section 3 is on methodology; Section 4 is on results and discussion and Section 5 concludes.

2. Literature review

Capital structure of a firm explains the finance of the firm's activities using the combination of debt and equity to optimise the value of the firm. The controversy relating to the concept of capital structure and the value of the firm was triggered by the paper presented by the Modigliani and Miller (1958) that was titled "the cost of capital, corporate finance and the theory of investment". They concluded that, the value of the firm is irrelevant to the determination of the value of the firm and that optimal capital structure should not be a problem. This is because, the value of the firm is said to be indifferent to the capital structure and the finance options. This position was supported with the argument that choice of financing does not affect the question of whether or not the investment is worthwhile, but they noted that there was a possibility for the managers to prefer one form of financing to the other. However, their conclusion was based on unrealistic assumption of perfect financial market conditions. For example, they assumed that there is no transaction costs and existence of the perfect market. Bailey (2010) demonstrated when capital market is perfect using MM- theorem. That is, if an investor is to duplicate the effects of economic behaviour taken by corporation, they must be able to borrow or lend on the same conditions as the firm. Therefore, what is important, is not that taxes are neutral but the rate of taxation is the same. Thus, the MM's irrelevance theorem does not necessarily fail when taxes differ among financial structure and income source.

The interest generated by the M&M irrelevant hypothesis led to the study of Modigliani and Miller (1963) when the assumption of perfect financial market was relaxed for a more realistic assumption. They concluded that, as a result of the tax advantage of debt finance, the choice of finance could influence the value of the firm and the attainment of optimal capital structure becomes relevant and major concern to managers. Gordon and Chamberlin (1994) focused on how specific market imperfections (tax system, agency and bankruptcy costs) can violate the MM theorem and make significant effect of leverage on the firm value. According to Chang (2004), the MM's first theorem can be verified in an environment where there is no financial market for lending and borrowing, and does not require that investors and companies use the same rate of interest.

Nevertheless, the Modigliani and Miller irrelevant hypothesis triggered academic discuss that lead to the current attention and the development of capital structure as an aspect of corporate finance. Carpenter (2006) tested the irrelevance proposition that the value of the firm is not affected by a change in the firm's leverage level using the M&M hypothesis and the pecking order theory. The aim was to determine the long term effect of capital structure change. The study concluded that the relationship was not significant in predicting a causal relationship between the leverage level and the value of the firm.

The relationship between capital structure and performance was examined by Kinsman and Newman (1999). They noted that examination of the relationship between capital structure choice (i.e. debt level) and firm's performance is very important for many reasons. Among these reasons: first, mean firm debt level have risen substantially over the last periods, requiring an explanation of the impact of debt level on firm's performance, so that appropriate debt level decisions can be made in a particular firm. Second, since managers and investors may have different emphases, the relative strengths of any specific effects of debt on firm's performance must be known. Final, and most important, reason for studying debt level and firm's performance is to examine the association

between debt level and shareholders wealth, since shareholders wealth maximisation is a primary goal of firm's managers.

In the same vein, Ebaid (2009), investigated the impact of capital structure choice on firm performance in 64 Egyptian firms from the period of 1997–2005 using multiple regression analysis. The study indicated a weak relationship between the capital structure and the performance of the firm. Although a long period of study, the test of structural break was not apparent. Abbadi and Abu-Rub (2012) examined the relationship between the market efficiency and capital structure of eight out of ten Palestinian financial institutions from 2007 to 2010. The idea was to assess how efficiency and capital structure impacts return on assets and return on equity. The study showed that, leverage has a negative effect on market value of the bank, a positive and strong relationship between market value and ROA and bank deposits to total deposits. However, as one would expect, the article shows multicollinearity between ROA and ROE.

Shim and Seigal (2009) stated that "the primary objective of capital structure decision is to maximise the market value of the firm. This is through the use of an appropriate mix of long-term sources of funds". This mix which is the optimal capital structure will, however lead to the minimisation of the overall cost of capital through the variation of the mix of the fund used.

Companies are established and financed by the owners with the intention of increasing the wealth of the owners through the financial performance of the firm. The achievement of this objective becomes complicated as the firm increases in size and scope and because such firm might not be managed directly by the owners, therefore there is a separation between the management and the owners. This relationship will lead to the agency problem with the associated agency cost.

Adam (1994) identified examples of agency problems as the managers might involve in perquisite consumption and the problem of adverse selection. As a result of the owners not having full information when a decision is made, this will then make it impossible for the owner to determine whether the manager is acting in the best interest of the firm. Atrill and Mclaney (2009) also confirm the existence of agency problem when they observed that there is the expectation that the managers will take decisions that will optimise the owners' interest. However, to optimise the value of the firm they are confronted with the agency problem for instance to increase the return on investment the manager must expose the firm to high level of risk. This is consistent with the results of Zhang and Kanazaki (2007) when they tested static trade-off and pecking order models on a sample data of 1325 non-financial Japanese firms for 2002–2006. However, the static trade-off model failed to explain the negative correlation between profitability and firm leverage, and the pecking order model failed to explain the low deficit coefficient. This could be attributed to heterogeneity between the firms which were pooled together.

Rocca (2007) and Maghyereh (2005) noted that there is a link between the value of the firm and its capital structure. Both studies observed that, corporate governance, efficiency could be motivated by capital structure and the attainment of optimal capital structure will eventually lead to the attainment of the equilibrium value of the firm. In addition, Rocca (2007) argued that the corporate governance could play a mediating role between the value of the firm and the capital structure. That is the choice of the capital structure could be influenced by the corporate government policy of the firm for instance there could be a deliberate use of debt financing to reduce the information asymmetry problem.

The pecking order theory came out of the work of Myers (1984) and that of the Myers and Majluf (1984) in which they observed that there is an order in which they observed that there is an order in which the financing of a firm activity do follow. They stated that the firm will exploit the use of internal financing such as retain earnings before the consideration of the external sources. However a firm with deficit retain earnings will consider the use of debt financing while the equity financing will only be used as the last resort. This is because investors consider equity as being riskier than debt and therefore expect a higher return on equity than debt.

Dang (2013) conducted an empirical study of zero leverage of 6232 US firms over the period 2002–2012 and observed that the zero leverage firms can be classified in term of dividend payment. That is the payer and non-payer. He then concluded that these groups have different motive to have eschewed debt. The non-payers could have zero leverage because of financial constraints while the payers could deliberately have zero leverage to avoid investment distortion as a result of issue of debt.

Salawu (2007) conducted cross-sectional research using selected 25 financial managers of Nigeria financial firms to illustrate the factors that determine the capital structure. Contrary to what was

obtained in the western developed countries, this study showed that leverage of Nigeria firms were dominated by short term debt. This was the consequence of the financial market development and the availability long term credit. The study concluded that there is a positive correlation between leverage and growth opportunities, dividend paid and the size of the company. Although the study had 100% response rate, it is not clear how the financial managers we selected to be included in the sample. Nevertheless, the results were consistent with the findings of Salawu and Agboola (2008). However, both studies concentrated on the use of fixed effect to test the trade-off theory which could not establish a causal relationship. In addition, Akinyomi and Olagunju (2013) when they analysed 24 Nigeria non-financial firms from 2003 to 2012, they observed a negative relationship between leverage and the size of the firm. Nonetheless, there was multicollinearity between size and tangibility and autocorrelation depicted by high Durbin Watson of 2.371. This was another attempt at the study of the static trade off concept while ignoring the adjustment to the target capital structure.

3. Methodology

This research is based on a panel data of selected large non-financial companies that are listed in the Nigeria stock Exchange for the period between 2007 and 2012. These companies are called NSE 30. The inclusion criterion was that a firm must have continues data for six years of study. The data used for this study was collected from the Orbis database for the benchmark information that enable global comparativeness and to guarantee the reliability and the integrity of the data while few missing information were collected from the annual report.

The empirical framework for the critical examination of the capital structure determinants and the speed of adjustment to the target capital will be constructed based on the Myers (1984), Rajan and Zingales (1995), Shyam-Sunder and Myers (1998) and Cotei et al. (2011) to determine the model that will be used for the determination of the fixed effects and the dynamic partial adjustments. In order to estimate the effect of regressors on the regressand, we used pooled ordinary least squares (OLS), the random effects and fixed effects. Under the hypothesis that there are no group or individual effects among firms included in our sample size, we estimated the pooled OLS model which takes the form of:

$$\mathrm{LEV}_{it} = \beta_1 + \beta_2\,\mathrm{SIZE}_{2it} + \beta_3\,\mathrm{PROF}_{3it} + \beta_4\,\mathrm{TANG}_{4it} + \beta_5\,\mathrm{GROWTH}_{5it} + \beta_6\,\mathrm{ETR}_{6it} + \mu_{it} \quad (1)$$

where β_1 is the common coefficient and μ is our unobserved variables. The model estimates a common constant for all cross-sections firms. The main assumption of this estimation method is that the regression coefficient, both the slope and the intercept are equal for all firms. This estimation method ignores any form of heterogeneity across firms. That is, if heterogeneity is observed for all individual firms, then this means there is only the constant term for all firms, then the entire model can be treated as an ordinary linear model and fit by least square.

Since the panel data contain observations on the same cross-sectional firms over the years 2007 to 2012, there might be cross-sectional effects on each. Fixed effects and random effects are available in order to deal with such problems. Fixed Effect Model (FEM) assumes differences in the intercepts across the firms each individual intercept does not vary over time, which means that it is time invariant. However intercept vary between cross-sectional firms so each firm has fixed, unique intercept and differences in the intercepts reflect the unobserved differences between these cross-sectional units. These differences could be due to differences in different firms, for example managerial style or philosophy. This takes the form of:

$$\mathrm{LEV}_{it} = \beta_{1i} + \beta_2\,\mathrm{SIZE}_{2it} + \beta_3\,\mathrm{PROF}_{3it} + \beta_4\,\mathrm{TANG}_{4it} + \beta_6\,\mathrm{GROWTH}_{6it} + \beta_7\,\mathrm{ETR}_{7it} + \mu_{it} \quad (2)$$

We estimated these cross-sectional fixed effects among firms and found that they are not significant either individually and as a group.

While the random effect model estimates the coefficients under the assumption that individual or group effects are uncorrelated with other regressors. The model allows the intercepts to vary between units, but variation is treated as randomly determined. It takes the form:

$$\mathrm{LEV}_{it} = \beta_1 + \beta_2\,\mathrm{SIZE}_{2it} + \beta_3\,\mathrm{PROF}_{3it} + \beta_4\,\mathrm{TANG}_{4it} + \beta_5\,\mathrm{GROWTH}_{5it} + \beta_6\,\mathrm{ETR}_{6it} + \mu_{it} + \varepsilon_{\mathrm{I}} \quad (3)$$

where $\varepsilon_i + \mu_{it} = \omega_{it}$.

ω_{it} is the error component which consists of cross-section error component and time series error component (Gujarai, 2003). Therefore, one obvious disadvantage of random effect is that there is need to make specific assumptions about the distribution of a random component. That is the error components are not correlated with each other and are not autocorrolated across both cross-section and time series units. If the unobserved group specific effects are correlated with explanatory variables, then the estimates will be biased and inconsistent. Nevertheless, if the variance of the error terms is zero, then there is no difference between the random effects and pooling of data, in which case the researcher could use Pooled OLS.

To choose between the fixed effect models (FEM) and the pooled OLS model depends on the F test. The null hypothesis states that all dummy parameters except one are zero. A large F statistic rejects the null hypothesis in favour of the fixed group effects model, $p < 0.0000$. This leads one to conclude that fixed effect model is better than the pooled OLS model.

Furthermore, it is important to choose between Random Effect Models and Pooled OLS. The null hypothesis of one way random group effect is that the variance of the group are zero or if the variance of the error term is zero, then pooled regression is appropriate. We used the Hausman test to test the use of Random effect or Fixed effect.

3.1. Determining speed of adjustment

Following the work by Heshmati (2001), let the target leverage of firm i in period t be LV^*_{it} be a linear function of a set of L explanatory variables, X_{jit} (where $j = 1, 2, \ldots, L$) that have been used in the past:

$$LV*_{it} = \alpha_j X_{jit} \tag{4}$$

The dynamic ratio implies that the target leverage may vary from firm to firm over time. Assuming that there are no frictions, the observed leverage of a firm on a particular should be equal as the target leverage. That is LVit = LV*it. On the other hand, if it is costly for the firm to adjust their leverage, then it will not correct the actual debt ratio from the previous period to the current target level.

We estimate that firm i has target leverage at time t denoted as $LV^*_{i,t+1}$ which is determined firm's characterises. This can be expressed as:

$$LV*_{i,t+1} = X_{it} Y \tag{5}$$

where Y is the coefficient vector and $LV^*_{i,t+1}$ is market leverage. For any firm to have a target leverage, then there must be at least some the elements of Y different from zero. We follow Flannery and Rangan (2006) partial adjustment model which takes the form of:

$$LV*_{i,t+1} - LV_{it} = l(LV*_{i,t+1} - LV_{it}) + ci + \varepsilon_{i,t+1}. \tag{6}$$

where λ is the speed of adjustment that captures the extent of desired adjustment to the optimal leverage from t to $t+1$, ci is the time invariant unobserved elements of the firm and $\varepsilon_{i,t+1}$ is the error term. We assume that $\lambda < 1$which implies that a firm does not adjust fully from t to $t+1$ due to the existence of adjustment costs. Also, if $\lambda > 1$ then it means that the firm rebalances its leverage level more than necessary which could be as a result of unanticipated changes in economic condition. Therefore, the higher the value of λ denotes that a faster speed of adjustment and the reverse is true. On the other hand, if λ is zero, then there is no adjustment at all and if $\lambda = 1$, then it implies full adjustment is achieved within one period and actual leverage at the end of the period will equal to target as set at the beginning. In addition, we explicitly allow for asymmetries in the adjustment process by creating two separate distance variables. One with a positive distance implies that firms are underleveraged and one with negative denotes that they are overleveraged. We assume that the speed of adjustment across firms is the same.

In dynamic panel context with a fractional and lagged dependent variable, it is very difficult to separate the FE that is the unobserved, time invariant firm heterogeneity from maximum likelihood estimates. In order to solve this problem of incidental parameter problems, we estimate the FE as suggested by Baltagi (2009) and include them as variable in pooled OLS. This is because the pooled

OLS assumes that there are no FE across the firms. However, as pointed, there is likely to differences that does not change with time across the firms.

We note that the use of dynamic panel GMM in estimating the speed of adjustment has been criticised in the past in that it is biased in the context that the variable of interest, for example market debt is bounded between zero and one (fractional). However, we employ its use in order to make a comparison with pooled OLS. The severe bias has been demonstrated by Chang and Dasgupta (2009) using parametric and non-parametric simulation approaches. The authors illustrate that the standard estimators erroneously attribute the fact the observed debt ratios remain in the [0,1] interval to be due to mean reversion. This provides a positive speed of adjustment estimates even if a financing decision occurs at random. We estimate capital structure and speed of adjustment to target leverage level. In estimating the speed of adjustment, we follow four steps.[1]

Few of the previous works address the cross-sectional heterogeneity in adjustment speed (Flannery and Hankins, 2007). The authors focus on one specific issue and not all factors as we do in this research. However Faulkender et al. (2010) come close to our study by examining the effect of cash flows, financial constraints and market timing variables on the speed of adjustment.

3.2. Robustness check

We checked for normality before undertaking the panel unit root test on all variables to ensure that the series are stationary. This is because a model whose coefficients are non-stationary will exhibit the unfortunate property that the previous values of error term will have a non- declining effect on the current value as time progresses. We also tested that there is no multicollinearity of the variables. If two predictors are perfectly correlated, that is they move together, then the value of β for each variable are interchangeable and difficult to distinguish the separate effects of these variables on leverage. To affirm this, we also carried collinearity test to ensure that there is no violation of the assumption underlying the use of regression analysis. Myers (2001) point out that if Variance Inflation Factor (VIF) is greater than 10, then there would be a cause of concern. Also, in order to check whether one regression is sufficient, we used a Chow test to test for structural stability. However, because of the weakness of test in determining the break, we used recursive regression in order to estimate the possible break.

In addition, we tested for heteroscedacity to check whether the variance of the error terms differ across observations. This is because the variation will cause the standard errors to be biased and hence biased inferences. Using Breusch-Godfrey LM, we also tested the presence of serial correlation of the residuals in addition to Durbin Watson test because of its weakness in that it can have inconclusive results. Similar to heteroscedasticity, serial correlation in the residuals will lead to incorrect estimates of the standard errors, and invalid statistical inference for the coefficients of the equation.

4. Analysis and findings

This study was based on the use of both the short term and the long term definition of leverage hence the three definitions of capital structure was adopted for the regression analysis, while the main theories of the trade-off theory and the pecking order theory was tested using the adopted static and the dynamic capital structure model.

Table 1 illustrates the descriptive statistics of the sample variable. The mean leverage was 0.629 which indicate that leverage constitute 63% of the capital structure of Nigerian firms. The results also indicate that, short term leverage that accounted for 76% of the total leverage. While the maximum leverage level is 99% and the minimum being 26%. In terms of maturity profile, the mean leverage for short term debt is 48%, while that of long term is 16%, which implies that most of the firms in Nigeria are financed mainly from short term sources. In terms of profitability, the mean return on asset is 16%.

[1] First we estimate a static model where the dependent variable is the actual rather than target leverage. The second step is to estimate the dynamic model using the estimated parameters from the first step. The third step is we estimate the fixed effects from the second step of estimating using the fixed effect model. The fourth step is then re-estimate the pooled OLS again but this time we include the time invariant firm fixed effects that we estimated in the third step.

Table 1
Descriptive statistics.

	LEV	LEVLT	LEVST	PROF	TANG	SIZE	ETR	GROWTH
Mean	0.629	0.159	0.484	0.161	0.501	5.257	0.247	0.161
Median	0.631	0.122	0.447	0.137	0.517	5.238	0.288	0.085
Maximum	0.998	0.829	0.898	1.291	0.808	6.401	0.810	1.725
Minimum	0.264	0.000	0.142	−0.042	0.098	3.731	−3.030	−0.394
Std. dev.	0.156	0.135	0.161	0.150	0.151	0.564	0.360	0.320
Observations	96	96	96	96	96	96	96	96

LEV is the firm's total debt, LEVLT is the firm's long term debt, LEVST is the firm's short term debt, PROF is the firm's profitability, TANG is the firm's tangibility (ability to provide collateral), SIZE is the firm size, ETR is the effective tax rate and GROWTH is the firm's growth opportunities.

In terms of bivariate analysis, Table 2 below shows the correlation coefficient between the variables. The results show that, there is a negative association between total leverage and profitability. The results indicate that the firms in Nigeria follow pecking order theory in the sense the more profitable the firms are, the less the leverage level. In addition, the size of the company positively influences the leverage level, implying large firms tend to be more leverage. This could be because large firms are likely to have fixed assets that can be used as collateral. In addition, the growth opportunities exert pressure to look for external funding as shown by a positive correlation between growth and leverage.

In addition, as shown in Table 3 below across all models, size has positive coefficient and significant with pooled OLS. This implies large firms are more leveraged. The positive coefficient of size is consistent with the findings of Salawu (2007), Salawu and Agboola (2008) and Ezeoha (2011) while contrary to the finding of Akinyomi and Olagunju (2013). This could be attributed to the fact large firms have assets that can be used as collateral. In addition to a certain extent, large firms have been in the market for a long time and hence known to the bond market. Also, with the exception of short term leverage, the results shows that when a firm has growth opportunities, it is likely to be leveraged, especially if the retained earnings are not sufficient and following pecking order theory. This is depicted by positive coefficient and significant ($p < 0.0001$) with Pooled OLS.

The results also show that firms in Nigeria follow pecking order to a certain extent. That with the exception of short term debt, profitability is negatively correlated with total leverage ($p < 0.001$, with pooled OLS) and long term leverage ($p < 0.001$, with fixed effects model). The current findings are in line with that of (Titman and Wessel, 1988; Harris and Raviv, 1991; Allen, 1991; Rajan and Zingales, 1995; Colombo, 2001; Chen, 2003; Gropp and Heider, 2010). Nevertheless the results do not support the agency theory in that, the more the profitable the firm is, the more the managers are likely to consume large perquisites. As a result, debt is one way of committing the profits in terms of interest payments and also as a way of controlling the manager's activities. As regards to short term leverage, the firms can be said to be following the trade-off Theory in the sense the more profitable, the

Table 2
Pearson correlation between the variables.

	LEV	PROF	TANG	SIZE	ETR	GROWTH
LEV	1					
PROF	−0.026	1.000				
TANG	−0.141	0.114	1.000			
SIZE	0.307	0.168	0.278	1.000		
ETR	0.067	0.054	0.006	−0.078	1.000	
GROWTH	0.072	−0.165	0.245	−0.034	0.057	1

Dependent variable, LEV, total leverage. Independent variables, PROF, profitability measured as return on assets; TANG, tangibility measure as a proportion of fixed assets total assets; SIZE, firm size measured as long of total assets; ETR, effective tax rate measured as total tax paid as a proportion of profit before taxation and GROWTH, growth opportunities measured as percentage change of total assets.

Table 3
Regression result.

Variable	Total debt/leverage			Long term debt/leverage			Short term debt leverage		
	Pooled OLS	Fixed	Random effects	Pooled OLS	Fixed effects	Random effects	Pooled OLS	Fixed effects	Random effects
C	−0.160***	0.201	−0.164**	0.029	0.155**	0.149***	0.014*	0.085**	0.064*
	(0.0192)	(0.173)	(0.052)	(0.042)	(0.039)	(0.042)	(0.006)	(0.028)	(0.031)
SIZE	0.047***	0.0214**	0.046***	0.029***	0.212**	0.036	0.076***	0.034	0.053
	(0.004)	(0.014)	(0.009)	(0.008)	(0.065)	(0.034)	(0.009)	(0.094)	(0.039)
ETR	0.009*	0.069	0.0049	0.013	0.026	0.024	0.007*	−0.004	−0.008
	(0.005)	(0.015)	(0.013)	(0.011)	(0.027)	(0.025)	(0.014)	(0.035)	(0.033)
GROWTH	0.043***	0.034**	0.028*	0.128***	0.102*	0.065*	−0.026	−0.018	−0.018
	(0.007)	(0.019)	(0.015)	(0.014)	(0.038)	(0.033)	(0.018)	(0.054)	(0.044)
PROF	−0.039**	−0.006**	−0.031	−0.036	−0.008**	−0.002	0.030***	0.003**	0.005*
	(0.013)	(0.036)	(0.031)	(0.029)	(0.002)	(0.033)	(0.008)	(0.00)	(0.002)
TANG	0.066**	0.037	0.015	0.143***	0.048	0.025	−0.476**	−0.151	−0.293**
	(0.001)	(0.054)	(0.037)	(0.033)	(0.101)	(0.088)	(0.036)	(0.135)	(0.109)
LEVLT	0.683***	0.955***	0.903***				−0.260**	−0.536**	−0.402***
	(0.017)	(0.061)	(0.041)				(0.043)	(0.143)	(0.116)
LEVST	0.888***	0.665***	0.673***	−0.127**	−0.297***	−0.289***			
	(0.013)	(0.046)	(0.034)	(0.029)	(0.008)	(0.074)			
R squared (adjusted)	0.88	0.84	0.87	0.27	0.75	0.22	0.33	0.59	0.22
F statistic	954.26***	58.076***	85.37***	47.194***	10.79***	4.29***	58.31***	7.706***	5.318***
AIC	−3.009	−2.321		−1.461	−2.107		−1.218	−1.517	
DW	1.891	2.101	1.91	2.11	1.79	1.90	1.16	1.714	1.414

Dependent variables, total debt, long term leverage and short terms Leverage. Independent variables, SIZE, firm size; ETR, effective tax rate; GROWTH, growth opportunities; PROF, profitability of the firm; TANG, tangibility of the firm, LEVLT, leverage long term and LEVST is Leverage on Short term .AIC (Akaike Information Criteria) assesses the best model. According to AIC, the model with the lowest AIC value is more superior and DW is Durbin Watson assess the autocorrelation.

*** Significant at 1%.

** Significant at 5%.

* Significant at 10%.

more likely to take short term debts like an overdraft or credit purchases. This is shown by a positive coefficient of return on assets ($p < 0.000$). The positive relation between the growth opportunity and leverage was against the postulations of the agency theory, but consistent with the findings of Salawu (2007), Eldomiaty and Mohamed (2008), Ramjee and Gwatidzo (2012) and Akinyomi and Olagunju (2013).

In the same manner with growth opportunities, the results show that tangibility is positively correlated ($p < 0.001$) with both long term and total leverage. Whilst the more tangible fixed assets the firms have, the less likely to request for short term loans. This implies rather than requesting short term loans using collateral, firms prefer to look for long term debts. Also, there is a strong ($p < 0.0.1$) positive relationship between the taxation and total leverage in Nigeria firms. Therefore, the higher the tax rate, the more debt that the firm may have because the interest payment is deducted before tax is computed. This is because, the fact that interest on the debt is subtracted before taxation; the tax bill will be reduced marginally compared with the firm with less debt.

4.1. Speed of adjustment

Although in the current research firm fixed effects across the firms are not significant individually and as a group, adding them to the pooled OLS enables us to explore the variation of leverage, (Lemmon et al., 2008). The findings indicate that the firm' fixed effects account for 5% of leverage in manufacturing firms in Nigeria.

Indeed Huang and Ritter (2009) argued that speed of adjustment is perhaps the most important issue in the capital structure study. Even though we estimated the regression using pooled OLS, Flannery and Rangan (2006) argue that using pooled OLS estimate underestimates the speed of adjustment. This is because pooled OLS assumes that there is no unobserved heterogeneity at firm levels. Therefore, adding firm fixed effects to pooled OLS will improve the speed of adjustment. Thus the speed is given as $\mathrm{DIST} = \mathrm{LV}_{it}^{*} - \mathrm{LV}_{it}$ where LV_{it}^{*} is the fitted value from the FE regression of the debt ratio of firm i on the capital structure determinants as of time t. Intuitively, if the cost of adjustment is high, it is likely that the managers will avoid adjusting and use dividend policy to adjust towards optimal. That is adjusting internally. For example, if the firm need to adjust downwards its leverage level, it will limit the payment of dividends and in case of adjusting upwards, it may increase the dividend payout.

Using this approach as shown in Table 4, we find that firms in Nigeria adjust their leverage at a speed of 47% which implies that they take approximately 1.2 years to remove half of the effect of shock on its leverage. The GMM estimates the speed to be 28%, which shows that the difference between its use and pooled OLS to be insignificant. The findings are close to the previous work that find that the speed of adjustment is significantly different from zero. For example, Flannery and Rangan (2006) found the US firm adjust their leverage at a speed of 34% and Lemmon et al. (2008) estimates the speed to be about 25%.

The estimation of the speed of adjustment allows the testing of the trade-off theory predictions in that according to the theory, a firm has a target leverage level and moves towards that level over time. The 47% speed of adjustment for example, implies that every year, a firm gets roughly 47% closer to the leverage target. In striving to achieve its target, the firm has ideally four options. That is, one to retire debt or issue equity when it is overleveraged and it can repurchase the shares or issue debt when underleveraged in order to enjoy the benefit of debt. That is to say debt interest deduction, which shields the profits and also in order to control the activities of managers as they will be committed to payment of interest. The existence of debt payment helps in aligning the interest of the managers and that of shareholders. If a firm need to increase its debt in order to reach the target level, it might take longer time, especially if it has a more free cash flow and so less pressure to obtain external funds and also might want to preserve debt capacity. In contrast, a firm that needs to reduce debt so as to strive to target level, it might be able to adjust faster if they have generated more free cash flow. However transaction costs, including legal and investment bank fees may prevent firms from adjusting their target leverage continuously, especially if these costs are prohibitively high.

Table 4
Test of the speed of adjustment.

Variables	Pooled OLS	GMM
C	0.524***	−2.005
	(0.121)	(5.009)
D(LEV)	0.531***	0.878
	(0.031)	(0.082)
SIZE	0.032	1.376
	(0.025)	(1.135)
ASST	0.377***	−5.774
	(0.037)	(2.300)
PROF	0.185***	−7.891
	(0.027)	(2.905)
GROWTH	0.090**	0.071
	(0.037)	(2.070)
ETR	0.170***	−2.599
	(0.028)	(1.885)
FIXED	0.002	
	(0.014)	
D2	0.064**	1.544
	(0.006)	(1.199)
Adj. Speed.	47%	28%
R squared	0.891	
Adj. *R*-squared	0.881	
DW	1.919	

Ramsey reset test; *F*-test 1.216, *p*. 0.239.
*** Significant at 1%.
** Significant at 5%.

5. Conclusion

Motivated by continues interest in capital structure study, we examined to assess the speed at which firms adjust their leverage level. The empirical results shows that firms seek a target leverage. The dependence of a firm's leverage level of a firm characteristics has usually been interpreted in favour of either the trade-off theory or the pecking order theory. For firms in Nigeria profitability is negatively associated with leverage which is consistent with the prediction of Myers' pecking order hypothesis rather than the trade-off theory. Also, the results show that large firms appear to be highly leveraged, which supports the agency theory in that as firms grow in size, owners become devoid of control and hence will prefer debt so that managers can be committed to interest payment obligations. However, in presence of adjustment costs, it might be cheaper for firms not fully adjust their leverage level, even if they recognise that their leverage level is not optimal.

The existence of growth opportunities places greater demand of funds. If the internal funds are not sufficient, firms resort to external finance including debt. Also the existence of growth opportunities is a credible way to send a good signal to the bond market as an indication of good management with good future prospect and hence influencing the speed at which firms adjust their leverage.

A notable remark is that, firms in Nigeria prefer short term finance and have substantially low long term debt. A majority of empirical evidence argues that firms in developed countries prefer long term debt, which could be due to developed capital market. The result also depicts that to a certain extent, capital structure theory is portable across countries. This is because there are those factors like profitability and size that have been found to be significantly across developed countries.

However, our work has a limitation in that we did not include the growth of the economy (GDP) to assess how it influences leverage level and the speed of adjustment. In addition, it will interesting to observe the effect of stock piling debt capacity and stock price mechanism.

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