

Profitability and Debt Capital Decision: A Reconsideration of the Pecking Order Model

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Abstract

This paper tests for the adherence of firms in third world nations to the pecking-order model (POM) in determining their debt level. We developed two econometric models to query the pecking-order model (POM) as it applies to firms' financing decision in emerging economies. Cross-sectional dataset was constructed from the annual reports of 45 non-financial companies quoted on the Nigerian stock exchange in the year 2007. We employed Binary Logistic regression and Ordinary least squares (OLS) estimation techniques to estimate our models and to test the study hypotheses. Our results coherently reveal negative relationship between corporate profitability and debt utilization, and corporate debt limit relates positively to firms' tangibility and size. It therefore suggests that the pecking-order model (POM) applies to firms in third world nations as to firms in developed economies. Therefore, the possibility of a firm attaining an optimal capital structure remains a mirage. Because this study has made use of both proxy and dummy variables, the usual caveats therefore apply. Furthermore, the results are specific to only the sampled firms, thereby may lack generalizability to firms outside the sampled firms. Researchers are encouraged to further extend the suggestions of this study.

Keywords: Pecking-order model, financing decision, profitability, corporate debt, annual reports

1. Introduction

Subsequent to the Modigliani and Miller (1958) extrapolation on firms' financing decision, Donaldson (1961) injected his famous pecking order hypothesis into the ongoing debate on the capital structure puzzle. In a persuasive contrast to the Modigliani and Miller paradigm, he argued that, when firms are considering financing their investment projects, they follow a systematized order of preference as to their sources of finance. By his philosophical approach, Donaldson (1961) originally debunks the idea of a firm attaining optimality in its capital structure by a strategic composition of debt-equity capitals. Rather, he suggested internal funds to be the first capital preference a firm should opt for before considering external sources. Besides, debt should be preferred to equity.

Empirically supporting his propositions, Donaldson (1961) maintained that when companies become more profitable, the keenness for external financing becomes slighter since internal funds would be available to execute long-term projects. Furthermore, he conserved that only when internal available funds become insufficient that firms should consider external sources, preferably term loans before long-term debts, after which issuing new equity. However, experts and scholars alike have retorted fiercely to these predictions, some in support of its logic, while others with contrary opinions and doubts (Fama and French, 2002; Shyam-Sunder and Myers, 1999; Ahmed and Hisham, 2009; Myers, 1984). Notwithstanding its critics, the pecking order prediction thrives among contemporary theories and has gained a wide range of acceptability in the corporate circle.

Generally, within the confines of third world nations, the collapse of corporate entities can be traced to capital glitches and mismanagement of funds. For Salawu (2007), corporate distresses and collapse in Nigeria as in other third world nations, are associated with inadequate and inapt capital mix. Specifically, major observations are centered on the fact that most firms in Nigeria would rarely utilize debt capital to finance their long-term investments (Adeyemi and Oboh, 2011); rather, earnings are usually ploughed back and dividends are paid in the form of script issues. Thus, does this indicate that the Nigerian firms subscribe to the pecking-order hypothesis? Or to imply that the Nigerian debt market remains inefficiently developed as in most third world

nations (Adeyemi and Oboh, 2011; Salawu, 2007)? For these considerable observations, the following research questions are necessary to thrust the study into perspective:

- 1) To what extent does a firm's profitability affect its choice of debt capital?
- 2) In what way does a firm's profitability determine its debt limit?

This study primarily advocates for the opportunistic usage of debt capital in financing corporate investment projects irrespective of available internal funds. It makes extension in three ways to prior empirical researches on corporate capital structure. First, theoretically the range of capital structure determinants was expounded in the study by the re-examining of the pecking-order model to firms in third world nations. Observations by Salawu and Agboola (2008) noted that only minimal research efforts have been devoted into firms financing decisions in emerging economies. Besides, most reports are tinted towards the industrialized nations. Doubts are often expressed that studies conducted elsewhere, particularly in the industrialized countries usually may not achieve the same results in developing economies. Usually, in reality according to Errunza (1979) and Oboh *et al.* (2012), most theoretical fundamentals may not apply to most developing economies. Perhaps, these nations would rarely conform to contemporary philosophies on the capital market assumptions initiated from industrialized economies. Different countries usually legislates dissimilar jurisdicitive provisions such as, varied market regulations and economic growth level, bankruptcy and tax laws. Secondly, as most theories present dissimilar pragmatic implications due to disparate methodological approaches, we employed Binary logistics regression method to prove the validity of the pecking-order model. Thirdly, different from prior studies we applied the ordinary least squares (OLS) technique to estimate how profitability predicts corporate debt limits.

This study, to the best of our awareness is unique in its territory and methodological approaches. Immediate to this section is the review of prior literatures and hypothetical development, followed by the third section, which explains the empirical methodological approach adopted for the study. Section four presents the results and discussions, while section five summaries and conclude the study.

2. Theoretical Framework and Hypothetical Development

Stimulated by the Modigliani-Miller seminal proposition in 1958 on the capital structure of companies, successions of fierce disputes emerged both in empirical researches and in theoretical persuasions on the possibilities of individual firms attaining an optimal debt to equity position. Financial experts and scholars have tried explaining how a firm determines its capital structure, and what constitute optimal leverage position for companies. Ensuing from the ongoing debates on the capital structure puzzle were the emergence of several theories, among which were pecking order theory, agency cost theory and the static trade-off theory (Oboh *et al.*, 2012; Bokpin and Isshaq, 2008). Holding to these assumptions, that there exist unfettered arbitrage opportunities, no corporate taxes and bankruptcy costs, Modigliani and Miller (1958) hypothesized an irrelevant position of a firm debt-equity mix to its market valuation.

However, contrary to the Modigliani-Miller model, Donaldson (1961) refuted the impression of firms having unique debt to equity ratio by introducing his famous pecking-order model. Credited to his arguments, it is usually assumed among scholars that a firm's choice of debt to equity mix is not subjective to any factor, rather, regardless of any factor; firms follow a structured pattern to finance its long-term investment projects. Thus, the pecking-order model suggests that:

$$\Delta D_{Lit} = \alpha_i + \beta_1 * \Delta \pi_{it} + \varepsilon_{it} \quad (1)$$

Where ΔD_{Lit} is the debt level change for firm i at period t , and $\Delta \pi_{it}$ is the change in the profitability of firm i at period t . Therefore, owing to these assumptions, the option for debt capital for a firm only depends on whether, or not its internal funds are sufficient to finance its investment projects. Simply put, profitable companies utilize less debt compared to less profitable companies (Donaldson, 1961; Fama and French; 2002; Khrawish and Khraiweh, 2010; Myers, 2001). However, contrary to these arguments, our first hypothesis is:

$$\mu_0: Do \neq \Delta \pi \quad (\text{Hypothesis 1})$$

Where Do is the option for debt capital for a firm and $\Delta \pi$ indicates the changes in the firm's profitability level. Thus, to expand our hypothesis, we simply suggest that firms' profitability does not determine whether, or not it will make use of debt to finance its investment projects.

Construed from this hypothesis, we assumed that a firm would opt for debt capital irrespective of available internal funds. This is stimulated out of the fact that the costs of capital and corporate dividend policy could affect debt choice. That is, when management perceives the cost of utilizing internal funds to be relatively higher than the cost of debt, it certainly would opt for debt regardless of how profitable the firm may be at that

point. Still, most profitable firms may wish to benefit from the tax-savings associated with debt capital, when corporate tax laws permit deductions of interest payment (Modigliani and Miller, 1963). Therefore, with regard to **hypothesis 1**, we do not expect corporate profitability (π) to negatively relate with debt option (Do). This expectation however is contrary to most empirical studies that have projected profitability to be negatively related to debt-equity ratio (Myers, 2001; Khrawish and Khraiwesh, 2010).

Shortly after the Donaldson (1961) denunciations on the first Modigliani-Miller paradigm, still in the thick of strident contrast, Modigliani and Miller (1963) reargued in their tax-corrected paper, that when interest payments are deductible as permitted by the corporate tax laws, firms' value increase proportionately with leverage, thus, proposing a 100 percent debt level for firms' optimization. That is, ρ on an after tax basis, with tax rate τ_c , levered firms' market value equilibrium is specified by:

$$V_L = \chi (1 - \tau_c) / \rho + \tau_c D_L \quad (2)$$

Where, χ equals expected $EBIT$, $\tau_c D_L$ represents the interest tax-shield value (i.e. the tax advantage of debt), and $\chi (1 - \tau_c) / \rho$, the value for only equity-financed firms (V_w). Therefore, if χ is given, V_L will increase with leverage, since interest expense is tax-exempt (Abu, 2008; Modigliani and Miller, 1963). However, in spite of the success posited by this model, to account, only few of such companies exist in reality. Probably due to doubts usually expressed as to interest tax-shield, and perhaps the existence of personal income taxes and non-debt tax savings, thereby setting limit to the limitless tax savings to debt (Miller, 1977; DeAngelo and Masulis, 1980).

Relative to the Modigliani-Miller second proposition in 1963, the static-order model on the other hand hypothesized that whenever the net tax savings of debt poises associated leverage costs such as bankruptcy and financial distress costs, holding firms' investment and assets decisions constant, then optimal capital is attained (Baxter, 1967; Altman, 1984). However, Ahmed and Hisham (2009) expressed doubts concerning the increased tax-savings advantage as a result of debt issue, and whether it may pay-off for distressing costs like competitive risk and bankruptcy costs when a firm is anxious for cash. In reaction to this argument, Myers (1984) asserted that, perhaps firms may be thought as setting a debt-value target ratio with enduring efforts to attaining such objective. Therefore, in relation to the Modigliani and Miller second proposition coupled with the static-order model, we put forth our second hypothesis as:

$$\mu_o: \Delta DL \neq \Delta \pi \quad (\text{Hypothesis 2})$$

Where ΔDL indicates changes in the debt limit for the firms and $\Delta \pi$ is the level of change in the firms' profitability, therefore, our null hypothesis simply suggests that the change in corporate debt limit does not depend on the change in firms' profitability.

Furthermore, the static-order model holds that matured and bigger companies utilize more debt compared to equity, and that profitable companies should utilize more debt since more profits would be protected from taxation. However, others have provided further extension to this model with methodical critique on its predictions (see Myers, 1984; Titman and Wesels, 1988; Miller, 1977; Fama and French, 2002; DeAngelo and Masulis, 1980; Bradley *et al.*, 1984; Barclay and Smith, 1999). Consequently, with regard to this model, our third hypothesis is:

$$\mu_o: \Delta DL \neq \Delta Size \quad (\text{Hypothesis 3})$$

Where the change in the debt limit of a firm is represented as ΔDL and $\Delta Size$ is the change in the firm's size, therefore, our third hypothesis presented in its null form, simply proposes that a change in corporate debt limit is not predicted by the variation in firms' size. Our arguments from these three hypotheses are largely informed based on the fact that companies will still opt for debt irrespective of available internal funds (Modigliani and Miller, 1963; Barclay and Smith, 1999). Therefore, debt limits are not determined by how profitable a firm may be, rather, factors such as size, tangibility, growth opportunity, tax-shield advantage, and cost of capital among others could influence a firm's debt limit (see Smith, 1977; Barclay and Smith, 1999; Titman and Wesels, 1988; Guha-Khasnobis and Kar, 2006; Ahmed and Hisham, 2009). Hence, contrary to most empirical studies, we predict that corporate profitability and size will positively relate with firms' debt to equity ratios.

To further compliment our arguments, the predictions of Jensen and Meckling (1976) on the agency cost theory presumes that when the costs of conflicts between the principal and its agents are minimized, then optimal capital structure is attainable. This theory, contrary to the pecking-order model originally supports the idea of a firm attaining capital structure optimality by a unique debt-equity synthesis since debt limit could be determined by factors other than profitability alone. Further extension and critiques to this theory can be found in Parrino and Weisbach (1999), Myers (1977), Hart and Moore (1988) and Jensen (1986).

3. Empirical Models and Estimation Method

To estimate our models and test our hypotheses, we employed Binary logistic regression and OLS estimation techniques. We constructed our cross-sectional dataset from the annual financial reports of 45 non-financial quoted companies in the year 2007. We relied on a purposeful sampling method to determine our sample size, which was arrived based on data availability and set criteria. First, out of 212 total quoted companies for the designated period, all financial and similar firms amounting to 69 companies were exempt due to the peculiarity and nature of their capital structure. Likewise, firms with missing values, negative figures and no available annual reports totaling 98 companies were excluded, leaving us with a total of 45 non-financial companies (see Appendix 1). To obtain our data for analysis, we have relied on the annual reports of these companies as valid and reliable sources of companies' financial records. This is because we believe that quoted companies are statutorily mandated to submit their annual reports periodically to the Nigerian Stock Exchange, and these reports are statutorily required to be audited by recognized audit firms before their publications. Thus, our data obtained from these sources are valid and reliable for analysis.

Toward estimating our predictions and to test our hypotheses, we specify two econometric models, which are:

$$DO_i = \beta_0 + \beta_1 * \pi_i + \beta_2 * Size_i + \beta_3 * Tang_i + \beta_4 * DP_i + \varepsilon \quad (3)$$

$$DL_i = \beta_0 + \beta_1 * \pi_i + \beta_2 * Size_i + \beta_3 * Tang_i + \beta_4 * DP_i + \varepsilon_i \quad (4)$$

Where: DO_i is the debt option across i companies. This variable being the outcome variable for model three (3) is represented as a dummy variable {implying that, 1 represents the presence of debt capital (long-term debt only), while 0 signifies the absence of debt capital}, DL_i being the outcome variable for model four (4) represents the debt limits across i companies { $DL_i = \text{Total debt/Equity}$ }. Whereas π_i represents the firms' profitability across i companies {i.e. $\pi = EBIT/Capital\ Employed$ }, the natural log of sales is proxy to represent firms size, $Size_i$. Other control variables included in our models are $Tang_i$ {measured as fixed assets/Net assets to represent firm tangibility} and DP_i {represented as dummy variable where 1 represents dividend payment for the previous year (2006), while 0 represents no dividend payment same year}. ε is the error term and $\beta_0, \beta_1, \beta_2, \beta_4$ are the intercept and coefficients.

Whereas model three (3) tested *hypothesis 1* and estimates whether, or not a firm's profitability determines its option for debt capital in financing investment projects, model four (4), which differs only by its measurement of the dependent variable, tested *hypotheses 2 and 3* and estimates whether, or not firms' debt limit is predicted by their profitability and size.

4. Empirical Results and Discussion

4.1 Descriptive Analysis

To begin our investigation, we have presented the descriptive analysis for both the predictors and outcome variables required for estimation. We examined each of the respective variables according to their mean and standard deviation alongside their normal Skewness and Kurtosis distributions. Whereas for Skewness distribution, a right tailed position indicates a positive Skewed distribution and a left tailed position indicates a negative Skewed distribution, normal Kurtosis distribution has been proposed to be a value of 3 (Obboh *et al.*, 2012). Hence, values above 3 indicate substantial peak distribution level, while values below 3 indicate flatter peak distribution level. However, this should not be generalized as other factors affect the normal peak distribution of data. Table 1 reports the results of this analysis.

Table 1. Descriptive statistics

Variable	Mean	Std. Deviation	Skewness	Kurtosis	Minimum	Maximum	N
<i>DO</i>	0.470	0.505	0.138	-2.075	0.000	1.000	45
<i>DL</i>	1.841	2.978	3.952	16.272	0.135	16.616	45
π	0.161	0.132	3.649	18.238	0.029	0.868	45
<i>DP</i>	0.580	0.499	-0.326	-1.984	0.000	1.000	45
<i>Tang</i>	1.477	1.803	4.085	21.019	0.016	11.399	45
<i>Size</i>	6.680	0.938	-0.410	0.012	4.098	8.137	45

To report the outcome of our descriptive statistics, as seen in Table 1, the mean score (0.470) for *DO* simply suggests that most companies, on the average, barely opted for debt (long-term debt) in financing their investment projects. Similarly, the value (1.841) for *DL* signifies that most firms have their debt to equity ratio below average, suggesting that the debt level (total debt) of these firms is lower compared to their equity capital. Whereas the mean value (0.161) for π is an indication of low profitability, the value (0.580) for *DP* suggests more dividend payments across the sampled firms. In contrast, the value (1.477) for *Tang* suggests low tangibility for firms, while the value (6.680) for *Size* indicates larger firms across the sampled firms. Furthermore, *DO* indicated a right tailed Skewness distribution with a flatter peak value (Skewness=0.138 & kurtosis=-2.075). Likewise, *DL* and π show right tailed distributions (Skewness=3.952 & 3.649 respectively) but with high peak distributions (kurtosis = 16.272 & 18.238 respectively). Whereas *DP* and *Size* show left tailed distributions (Skewness=-0.326 & -0.410 respectively), both variables show flatter peak values (kurtosis = -1.984 & 0.012 respectively). *Tang* on the other hand reported a right tail distribution (Skewness=4.085) and a substantial peak value (21.019). To generalize, most of our variables appeared to be positively (right tailed) distributed and substantially peaked, with the exception of *DP* and *Size*, which appeared to be negatively (left tail) distributed and lowly peaked.

4.2 Correlation Analysis

Towards establishing correlational interactions among our variables for analysis, and to test for collinearity problem, we computed a correlation matrix. Table 2 reports the outcome of the correlation analysis performed at a 5% significance level.

Table 2. Correlations matrix

		<i>DO</i>	<i>DL</i>	π	<i>DP</i>	<i>Size</i>	<i>Tang</i>
<i>DO</i>	Pearson Correlation	1					
	Sig. (2-tailed)						
<i>DL</i>	Pearson Correlation	-0.236	1				
	Sig. (2-tailed)	0.119					
π	Pearson Correlation	-0.302*	-0.135	1			
	Sig. (2-tailed)	0.044	0.377				
<i>DP</i>	Pearson Correlation	-0.102	-0.059	0.175	1		
	Sig. (2-tailed)	0.504	0.698	0.250			
<i>Size</i>	Pearson Correlation	0.017	0.090	0.222	0.125	1	
	Sig. (2-tailed)	0.912	0.554	0.142	0.414		
<i>Tang</i>	Pearson Correlation	-0.159	0.844**	-0.056	-0.204	-0.109	1
	Sig. (2-tailed)	0.298	0.000	0.715	0.179	0.475	

* Significant at the 0.05 (2-tailed), **Significant at the 0.01 (2-tailed)

As reported in Table 2, whereas *DO* significantly but negatively related with π ($P = 0.044$ & $r = -0.302$), *Tang* significantly and positively related with *DL* ($P = 0.000$ & $r = 0.844$). From the Table, there seem to be no correlation among the explanatory variables. Therefore, we can conclude that our models are free from multicollinearity problem.

4.3 Binary Logistic Regression Analysis

To estimate model 3 and to test *hypothesis 1*, we employed Binary Logistic regression estimation tool. This tool estimates whether, or not a firm's profitability determines its option for debt capital in financing investment projects. Table 3 reports the outcome of this analysis.

Table 3. Binary logistic regression

Variables In Equation	Coefficient (B)	Standard Error	Wald Statistic	Degree of freedom	Exp. (B)	Prob. Value
π	-10.946	5.096	4.614	1	.000	0.032*
DP	-0.453	0.679	0.445	1	.636	0.505
Size	0.242	0.365	0.437	1	1.273	0.508
Tang	-0.341	0.296	1.327	1	.711	0.249
Constant	0.571	2.419	0.056	1	1.771	0.813
-2Log likelihood (only constant in model)		62.183	Omnibus Test of Model Coef:		$\chi^2 = 9.039$	(Sig. .060)
-2Log likelihood (variables included in model)		53.144 ^a	Hosmer and Lemeshow Test		$\chi^2 = 3.767$	(Sig. .806)
Cox & Snell R Square		.182	Classification Table of model:		0	24
Nagelkerke R Square		.243			1	21
					Overall Percent (%)	53.3
					Included observations:	45

a. Estimation terminated at iteration number 5 for parameter estimates changed by less than .001.

*Value is significant at .05 and **Value is significant at .10. Outcome Variable: Debt Option (*DO*).

Table 3 reports the outcome of estimating model 3 with Binary Logistic Regression estimator at a .05 level of significance. As reported in the Table, the classification of the outcome variable shows that the proportion of firms that did not opt for debt capital in financing long-term investment projects is not significantly different from those that opted. This conclusion is reached based on the percentage outcome (0:1 = 53.3%) in Table 3 and the mean score (0.470) in Table 1. The Wald statistics reports the explanatory variables that significantly predict the outcome variable (*DO*). From the Wald statistics, only profitability (π) significantly predicts whether, or not a firm will make use of debt capital to finance its long-term investment projects (0.032). However, this prediction is negative (-10.946) contrary to our expectation, and so, we affirm that non-financial companies in Nigeria adhere to the pecking-order model. With this outcome, in support of the Omnibus Test of Model Coefficient, *hypothesis 1* which is stated in the null affirmation is hereby reject ($\chi^2 = 9.039$ and significant at 0.10 { $p < 0.1 > 0.05$ }). This therefore implies that, as companies become more profitable, the lower their desire to opt for debt becomes since internal funds would be available to execute long-term investment projects. And so, only when internal funds are insufficient that firms may consider external sources of finance. Furthermore, we formally test for variation in the outcome variable by including other explanatory variables in model 3. As reported in the Table, whereas *Size* has a positive relationship with *DO* (0.242), *DP* and *Tang* have negative relationships with *DO* (-0.453 and -0.341 respectively), and none of them significantly predict the outcome variable ($P = 0.508, 0.505$ and 0.249 respectively). With these therefore, we conclude that whether or not a firm will make use of debt capital in financing long-term investment projects does not depend on how large or tangible they are, nor whether dividend is paid the previous year or not, but simply depends on the availability of internal funds.

To assess the robustness of our model, the -2Log likelihood (53.144), Cox & Snell R Square (.182) and Nagelkerke R Square (.243) were estimated. These statistics reveal how well our model fit the observed data. According to Field (2005), lower value of -2Log likelihood with explanatory variables inclusive in the model compared to -2Log likelihood with only constant indicates a fitted model { $-2LL$ (only constant) = 62.183 and $-2LL$ (variables included) = 53.144}. The difference (9.039) therefore indicates that when our explanatory variables are included in our model, we have a more accurate prediction compared to when it is only constant. Therefore, relying on the outcome of these statistics we could conclude that the explanatory variables in model 3 significantly improve our prediction of the outcome variable (*DO*). Actually, these statistics are analogous to each other, being variants in the same group. In addition, we estimated the Hosmer and Lemeshow goodness-of-fit test, which indicates how fairly well our model can be applied to the real world. Therefore, with $\chi^2 = 3.767$ and significant value = .806, our model does not diverge significantly from observed data, which is indicative that our model predicts real world data well.

4.4 Ordinary Least Squares Analysis

In order to estimate model 4 and to test *hypothesis 2 and 3*, we employed the Ordinary Least Square regression. This tool was used to estimate whether, or not a firm's profitability and size determines its debt limit in its

capital structure. Table 4 reports the outcome of this analysis.

Table 4. Least squares statistics

Variables	Coefficients	Standard Error	t-Statistic	Prob.
π	-3.424665	1.744601	-1.963008	0.0566
<i>DP</i>	0.724379	0.463275	1.563606	0.1258
<i>Size</i>	0.652387	0.245362	2.658874	0.0112
<i>Tang</i>	1.456989	0.126607	11.50796	0.0000
Constant	-4.535887	1.648653	-2.751269	0.0089
R squared	0.776307	S.D. dependent var.		2.978891
Adj. R-squared	0.753938	Mean dependent var.		1.841162
Sum squared resid.	87.34018	Schwarz criterion		3.923988
S.E. of regression	1.477669	Akaike info criterion		3.723247
Log likelihood	-78.77307	Hannan-Quinn criter		3.798081
F-statistic	34.70415	Durbin-Watson stat		2.221467
Prob. (F-statistic)	0.000000	Sample		45

Note: Dependent Variable: Debt Limit (*DL*). Method: Least Squares.

As reported in Table 4, a significant and positive relationship exists between *Size* and *DL* (0.011 and 11.507 respectively) and between *Tang* and *DL* (0.000 and 2.658 respectively). Whereas a fairly significant and negative relationship is reported between π and *DL* (0.056 and -1.963 respectively), an insignificant, but a positive relationship is reported between *DP* and *DL* (0.125 and 1.563 respectively). These results consistent with other empirical studies, suggest that firms' size and tangibility significantly predict corporate debt limit. Simply put, larger and more tangible firms are associated with higher leverage (see Titman and Wesels, 1988 & Ahmed and Hisham, 2009), while more profitable firms are associated with lower debt to equity ratio. Apparently, in one hand, this conclusion concurs with the static-order predictions of a firm size and its debt level, while on the other hand, it coincides with the Donaldson pecking-order predictions of a firm's debt usage and its profitability. To test our second and third hypotheses, the F-test and the associated p-value (34.704 and 0.000 respectively) as reported in Table 4 confirm that our model significantly explain the variation in the outcome variable (debt limit), and so, with these indications, hypotheses 2 and 3 which are stated in their null forms are hereby rejected. These therefore, establish the fact that a firm's debt limit is predicted by its size and profitability.

Furthermore, to assess the robustness of model 4, we estimated the R^2 (0.776) and adjusted R^2 (0.753) in our analysis. The figures displayed as R^2 and adjusted R^2 suggest that our model significantly explains 77.6% variation in the outcome variable and that when applied to the real world, 75.3% variation in the outcome variable is predicted by the explanatory variables included in the model. Therefore, this suggests that our model significantly fit the observed data. In addition, to check for collinearity problem in our model, which is one of the challenges faced when selecting variables to be included in a model, the Durbin-Watson test was performed. As suggested by Kohler (1994), a value of four of the Durbin-Watson test indicates upper limit, while a value of zero indicates lower limit. Therefore, if the outcome value equals two, there is an absence of autocorrelation, but a value lesser or greater than two signifies the presence of positive or negative autocorrelation among the predictor variables. Therefore, the result of our test (2.221) suggests that our model did not violate the independence of residuals assumptions (i.e. no collinearity problem). Likewise, the results of our correlation analysis in Table 2, indicates no significant relationship among the predictor variables included in our model.

5. Summary and Conclusion

In view of the fierce and ongoing debates among economic experts and academic scholars on the possibility of a firm attaining optimality in its capital structure, and on the determinants of its debt option, this paper introduced a dynamic approach to test the validity of the pecking-order model on companies in an emerging economy. Whereas we employed binary logistic regression technique to test whether or not a firm will opt for debt capital irrespective of available internal funds in financing its long-term investment projects, we estimated the extent to which profitability and firms' size determine corporate debt limit using the ordinary least square estimation technique.

Whereas our predictions are inconclusive, they attend to certify empirical regularities that are concomitant with

extant theories. Specifically, we sustained that profitability negatively relates to corporate debt option, which coincides with the Donaldson's famous pecking order theory (Donaldson, 1961). Perhaps, this is one possible reason why more profitable firms are associated with lower debt level. Similarly, corporate debt limit positively relates with firms' size and tangibility, which is consistent with the static-order theory by Baxter (1967). In this sense, larger firms are associated with higher debts.

Owing to the unavailability of actual and consistent theoretical data, using dummy and proxy variables are common practices in corporate finance research. Therefore, we have made use of both dummy and proxy variables in our models. Hence, the usual caveats for using proxy and dummy variables apply. Furthermore, our analysis do not extend empirical evidence for any effect on debt option and debt limit arising from cost of capital, corporate growth opportunities, or associated risks with debt. Likewise, our results are specific to non-financial companies quoted on the Nigerian Stock Exchange, thereby limiting our generalization to firms other than our sampled firms. Notwithstanding, our conclusion conforms to prior empirical regularities that are consistent with existing theories and serves as a basis for further extension to the puzzle of corporate financing decision in third world nations.

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Appendix 1

Sampled companies used for analysis

S/N	Companies	S/N	Companies
1.	A.G. Leventis Nig. Plc.	26.	National Salt
2.	Adswitch	27.	Neimeth Intr' Pharma
3.	Academy Press Plc.	28.	Nigerian Ropes Plc.
4.	Aluminium Extrus. Ind. Plc.	29.	Oando Plc.
5.	African Pet. Plc.	30.	Okitipupa Oil Palm Plc.
6.	Ashaka Cem. Plc.	31.	Okomu Oil Palm Plc.
7.	Avon Crown Caps & Cont. Plc.	32.	Premier Paints Plc.
8.	B.O.C Gases Plc.	33.	Presco Nig. Plc.
9.	Beta Glass	34.	PZ Cussons Nig. Plc.
10.	Benue Cement Comp. Plc.	35.	RT Briscoe
11.	Berger Paints Plc.	36.	Seven up Bottling Co. Plc.
12.	Big Treat Plc.	37.	Smart Products Nig.
13.	Chevron Oil Nig. Plc./MRS	38.	Total Nig. Plc.
14.	Conoil	39.	Trans-Nationwide Exp. Plc.
15.	Ipwa	40.	Tripple Gee & Comp. Plc.
16.	Japaul Oil	41.	UTC Nig. Plc.
17.	Julius Begger	42.	UACN Plc.
18.	Lafarge Cement Wapco Nig.	43.	UACN Property Dev.
19.	Longman Nig.	44.	Unilever Nig. Plc.
20.	May & Baker Nig. Plc.	45.	Vitafoam Nig. Plc.
21.	Mobil Oil Nig. Plc.		
22.	Nampak		
23.	Nestle Nig. Plc.		
24.	Nig. Bottling Co. Plc.		
25.	Nigeria-German Chem. Plc.		

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