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Information in the Tax Benefit Curves of Selected Nigerian Quoted Firms

Oluseun Paseda
Department of Banking & Finance, University of Ibadan, Nigeria.

Abstract
Following Graham (2000), this study evaluates the role of tax benefit curves in defining the risk appetite of selected Nigerian quoted firms in the setting of corporate debt policy. The non-financial corporations quoted on the Nigerian Stock Exchange (NSE) for the period 1999-2014 constitute the population of study. Out of these, 50 companies that met the minimum data criteria were selected as sample. Using a combination of the panel data least squares regression, Modigliani- Miller tax benefit formula, the Miller equilibrium and the Graham simulation technique, the research documents the following findings. First, firm-specific characteristics such as profitability, liquidity, size, market-to-book ratio and asset tangibility exert downward pressure on corporate borrowing consistent with pecking order arguments. In other words, asymmetric information rationalizes the aggressive debt posture of smaller, less profitable, less liquid firms with more risky intangible assets and low dividend-payers. The Kink and ZeroBenefit statistics are consistent with actual debt ratios being less than the trade-off model's predictions. The study recommends the use of non-debt tax shelters for corporate tax planning, government simplification of tax administration.

Keywords: *Capital structure, tax benefit curves, Kink, Zerobenefit, asymmetric information. JEL: G30, G32.*

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I. Introduction

A new puzzle that has emerged within the broader capital structure research is debt conservatism. The theory of finance should be able to explain why large, profitable and heavy tax paying firms do not fully exploit the potential tax savings generated by debt. At best, partial explanations exist for this debt conservative behavior such as avoidance of debt overhang or underinvestment problem (Myers, 1977), pecking order financing (Myers and Majluf, 1984) and free cash flow considerations (Jensen, 1986; Jensen & Meckling, 1976).

Myers (1977:147) observes "… an important gap in modern finance theory" and specifically the inability of the theory to fully explain why "tax savings generated by debt do not lead firms to borrow as much as possible". Myers (1977), following the Miller & Modigliani (1961) valuation model, analyses the two components of firm value, namely, the present value of (earnings generated by) assets-in-place and the present value of growth opportunities and provides implications for corporate debt policy. He concludes with a partial theory of corporate borrowing decision where the optimal debt is "inversely related to the value of growth opportunities or that part of the market value of the firm that is contingent on discretionary future expenditure by the firm" (Myers, 1977:170). More than two decades later, Graham (2000:1901) began with the questions "Do the tax benefits of debt affect corporate financing decisions? How much do they add to firm value?" and found that "Growth firms that produce unique products use debt conservatively" but "surprisingly, large, profitable, liquid firms also use debt sparingly…" This poses an even greater challenge to existing theories and intensifies the debt conservatism puzzle in the capital structure literature. Graham (2000) quickly concludes that "there are many unanswered questions as to why some firms appear to be underlevered. This area is fertile ground for future research" (Graham, 2000:1935). Graham & Tucker (2006) attempt to explain the debt conservatism puzzle through the investigation of the role of off-balance sheet tax shelters. They find that firms that use tax shelters use less debt on average than non-shelter firms. Their results are consistent with the view that those tax shelters act as nondebt tax shields which substitute for the use of interest tax deductions obtainable from debt financing (DeAngelo & Masulis 1980). Cohn, Titman & Twite (2020) study a court ruling that materially affected taxation in several European countries and "find that leverage ratios change little on average but increase substantially for capital-raising firms which should be the most affected by the tax changes." There is a precautionary view for debt conservatism as in Ayyagari, Beck & Hoseini (2020), Demirguc-Kunt, Peria & Tressel (2020) and Kim (2020) but this view is, at best, a partial rationale for low leverage ratios. Indeed, the capital structure puzzle persists (Myers, 2001; Barclay & Smith, 2020). In addition, many empirical papers on capital structure tests have focused on developed markets where capital market frictions may differ, in nature, from the imperfections in the developing capital markets. A central concern of

scholars has been the examination of how specific market frictions - such as taxes, transaction costs, information asymmetries, bankruptcy costs and so on - alter the central predictions of Modigliani & Miller (1958). Specifically, the presence of tax- induced frictions in developing countries suggests that emerging markets also provide an excellent laboratory for capital structure tests that incorporate the impact of market frictions. An early attempt on this path was provided by Soyode (1978) for the Nigerian market.

Amah & Ezike (2013) and Amah (2014) provide a developing country perspective to this apparent debt-conservatism of firms. Though bankruptcy and agency costs may discourage borrowing, the authors question whether these costs are large enough to be significant. As profound and robust as the observation of actual debt ratios of Nigerian corporations being less than the theoretical optimal levels, and the robust econometric analysis of financial leverage impact on corporate valuation, the papers exclude salient issues on the tax benefit functions of different corporations in Nigeria or how taxes contribute to value.

There is doubtless some truth in each of these postulates, but they do not add up to a rigorous, complete and conclusive explanation of corporate debt policy. This study seeks to add a developing country perspective to the tax-impact on capital structure debate and thus fill an important gap in the corporate finance literature.

Moreover, many scholars emphasize that the future direction of capital structure research should seek to quantify the impact of taxes on corporate valuation and financing decisions (e.g., Fama

2011, Fama & French 2012, An 2012, Korteweg 2010, Doidge & Dyck 2015). The Miller's (1977) equilibrium model which posits that there is no gain from leverage is also well known.

Modebe, Okoro, Okoyeuzu & Uche (2014) decry the flaws in the Nigerian tax environment leading to tax revenue leakages for the Government. To underscore the strength of a tax administrative regime, a common reference point by analyst is the ratio of tax revenue as a share of GDP. This ratio provides a quick overview of the fiscal obligations and incentives facing the private sector across countries. Low ratios of 'tax revenue to GDP' may reflect weak administration and large- scale tax avoidance or evasion. Firms can evade taxes without any real risk of detection or punishment. Shleifer and Vishny, for instance, point out that where public pressure on corruption or the enforcement ability of government is relatively weak – as is the case in many developing countries – this is in fact a fitting assumption. Low ratios may also reflect a sizeable parallel economy with unrecorded and undisclosed incomes. The presence of incentives for companies to exploit loopholes in existing tax laws and enforcement practices should make this line of capital structure research an exciting one in an emerging market (Adelegan, 2009, Adelegan & Ariyo, 2008). Fan, Titman & Twite (2012) find that a country's legal and tax system and corruption, among other factors, explain a significant portion of the variation in leverage and debt maturity ratios.

The purpose of this study is to evaluate the information in the tax benefit curves of selected Nigerian quoted firms on their borrowing behaviour.

The rest of this paper is organized as follows: Section 1 reviews prior work on the tax and non-tax explanations of corporate debt policy. Section 2 considers the methodology including data description, sample construction and definition of variables. Section 3 discusses the empirical results of the impact of taxes on borrowing and the tax benefit tables using three frameworks namely the Modigliani-Miller formula, the Miller equilibrium and Graham simulation model. Section 4 discusses the implications of the results and the final section concludes the paper.

1. Literature Review and Theoretical Framework

The Modigliani-Miller (1958) paper's central result is that, in a setting with complete and perfect capital markets, a firm's total market value is invariant to its borrowing behaviour. This powerful result demonstrated by their arbitrage proof sparked a major revolution in finance. In other words, MM pointed the direction that corporate finance theories must follow by showing under what conditions capital structure is irrelevant. Since then, many researchers have followed the path they mapped. The following six decades witnessed the thorough development of the perfect market theory in finance applications and its spread throughout economics. The diminishing returns associated with the maturing of this research have led finance scholars to concentrate increasingly on relaxing various perfect market assumptions, with growing attention to taxes, bankruptcy effects, agency costs and information effects. This study reviews tax-based explanations for the departure from the central MM results.

1.1 Theoretical Framework

This sub-section covers the tax explanations of corporate borrowing behavior.

The Foundations – Tax Explanation of Debt Policy.

Modigliani & Miller (MM 1958, 1963) wrote the seminal paper on cost of capital, corporate valuation and capital structure and concluded with the famous irrelevance propositions. In spite of the restrictive nature of

these assumptions, empirical evidence has found that relaxing many of them does not really change the major conclusions of the model of firm behaviour that was provided by Modigliani and Miller.

MM's (1963) tax-corrected view suggests that firms would adopt a *target debt ratio* so as not to violate debt limits imposed by lenders. In addition, the existence of personal taxes and costs of financial distress have been cited in the finance literature as possible offsetting measures to the interest tax shield advantage of corporate debt (Glover, 2016).

Consequent on the 'tax corrected' version of the MM hypothesis, the gain from leverage, G is the difference between the value of the levered and unlevered firm, which is the product of the corporate tax rate and the market value of debt. Miller (1977) modifies this result by introducing personal as well as corporate taxes into the model, in an attempt to bring it closer to the real world. The basis for the argument is that the firm's objective is no longer to minimize the *corporate* tax bill but to minimize the present value of *all* taxes paid on corporate income. "All taxes" include personal taxes paid by bondholders and stockholders. Under this stated assumption, the value of a levered firm can be expressed as

$$V_L = V_u + \frac{[1-(1-\tau_c)(1-\tau_{PE})]}{(1-\tau_{PD})} D \qquad (1).$$

Where V_u represents value of an unlevered firm of equivalent risk, τ_c represents corporate tax, τ_{PD} represents the personal tax rate on bond income and D = INT $(1-\tau_{PD})$/kd, the market value of debt. τ_{PE} is the personal tax rate on equity. Consequently, with the introduction of personal taxes, the gain from leverage is the second term in equation (1). It is important to emphasize that where both debt and equity income are taxed at the same effective personal rate (i.e., where $\tau_{PE} = \tau_{PD}$), the gain from leverage equals the product of the corporate tax rate and the market value of debt (hence, the impact of personal taxes can be ignored).

Further, equation (1) implies that the gain from leverage vanishes when:

$$(1-\tau_{PD}) = (1-\tau_C)\,(1-\tau_{PE}) \qquad (2)$$

When personal tax rate on stock is nil, then gain from leverage becomes

$$G = \frac{1-(1-\tau_c)\,D}{(1-\tau_{PD})} \qquad (3)$$

Miller's argument has important implications for capital structure. First, the gain to leverage may be much smaller than previously thought. Consequently, optimal capital structure may be explained by a tradeoff between a small gain to leverage and relatively small costs such as expected bankruptcy costs. Second, the observed market equilibrium interest rate is seen to be a before – tax rate that is "grossed up" so that most or all of the interest rate tax shield is lost. Finally, Miller's theory implies there is an equilibrium amount of aggregate debt outstanding in the economy that is determined by relative corporate and personal tax rates.

Thus, MM's and Miller's models can be summarized as follows. Under MM's model, the existence of corporate taxes provides a strong incentive to borrow implying an optimum debt ratio of approximately 100%. They ignore personal taxes. Miller's model considers both the corporate as well as the personal taxes. It concludes that the advantage of corporate leverage is reduced by the personal tax loss (resulting from higher personal tax rate on bond income relative to personal tax rate on common stock income). The important implication of the model is that there is no optimum capital structure for a single firm, although for the macro-economy, there exists equilibrium amount of aggregate debt. From a single firm's point of view, therefore, the capital structure does not matter. Miller's perpetual tax shield formula has served as one of the major references for those evaluating whether taxes can explain observed financing patterns. This formula is a cornerstone of the *static trade-off theory*, which posits that firms weigh the tax benefits of debt against the costs associated with financial distress and bankruptcy in order to find the optimal capital structure. This model has provided intuition and guidance for much of the empirical literature on corporate capital structure, which has uncovered several patterns in the data that are inconsistent with the static trade-off theory (Hennessy & Whited, 2005:1129).

Graham (2000), for instance, finds that, "paradoxically, large, liquid, profitable firms with low expected distress costs use debt conservatively." By debt 'conservatism', Graham means that firms fail to issue sufficient debt to drive their expected marginal corporate tax rate down to that consistent with a zero/low net benefit to debt based on the Miller formula. Also, Baker (2009) and Baker & Wurgler (2002) reject the trade-off

theory on different grounds stating, "the trade-off theory predicts that temporary fluctuations in the market to book ratio or any other variable should have temporary effects." Based on finding a negative relationship between leverage and an "external finance weighted average market to book ratio," they conclude that "capital structure is the cumulative outcome of attempts to time the equity market."

Miller's model has certain limitations. First, it implies that tax exempt persons/institutions will invest only in debt securities and 'high-tax bracket' investors in equities. In practice, investors hold portfolio of debt and equity securities. Second, the personal tax rate on equity income is not zero. As long as tpe is positive, more investors can be induced to hold debt securities. Third, investors in high-tax brackets can be induced to invest in debt securities indirectly. They can invest in those institutions wherefrom income is tax exempt. These institutions, in turn, can invest in the corporate bonds.

1.2. **Estimating the Tax Costs and Benefits of Corporate Debt**

The tax benefit of corporate debt is the tax savings that result from deducting interest from taxable corporate earnings. By deducting a single naira of interest, a firm reduces its tax liability by τ_C, the marginal corporate tax rate. (Note that τ_C captures both state and federal taxes!) The annual tax benefit of interest deductions is the product of τ_C and the naira amount of interest, *rdD*, where *rd* is the interest rate on debt, *D*. To capitalize the benefit from current and future interest deductions, the classic approach {Modigliani & Miller (1963)} assumes that tax shields are as risky as the debt that generates them and therefore discounts tax benefits with *rd*. If debt is perpetual and interest tax shields can always be used fully, the capitalized tax benefit of debt simplifies to $\tau_C D$.

Miller (1977) points out that the classic approach ignores personal taxes. Although interest payments help firms avoid corporate income tax, interest income is taxed at the personal level at a rate τ_{PD}. Payments to equity holders are taxed at the corporate level (at rate τ_C) and again at the personal level (at the personal equity tax rate τ_{PE}). Therefore, the net benefit of directing a naira to investors as interest, rather than equity, is

$$(1-\tau_{PD}) - (1- \tau_c)(1-\tau_{PE}) \quad (4)$$

The above Equation can be rewritten as τ_C minus the "personal tax penalty", $\tau_{PD} - (1-\tau_C)\tau_{pE}$.

$$\tau_c - [\tau_{PD} - (1-\tau_c)\tau_{pE}] \quad (5)$$

If debt is risk-free and tax shields are assumed to be as risky as the underlying debt, then the after-personal-tax bond rate is used to discount tax benefits in the presence of personal taxes. If the debt is also perpetual, the capitalized tax benefit of debt is:

$$G = \frac{[(1-\tau PD) - (1-\tau c)(1-\tau pE)]rdD}{(1-\tau PD)rd} \quad (6)$$

Thus far, τ_C has been presented as a constant. There are two important reasons why τ_C can vary across firms and through time. First, firms do not pay taxes in all states of nature. Therefore, τ_C should be measured as a weighted average, considering the probabilities that a firm does and does not pay taxes. Moreover, to reflect the carry forward and carryback provisions of the tax code, this averaging needs to account for the probability that taxes are paid in both the current and future periods. This logic is consistent with an economic interpretation of the marginal tax rate, defined as the present value tax obligation from earning an extra amount of taxable income today {Scholes, Wolfson, *et al* (2015)}. To reflect the interaction between U.S. tax laws and historical and future tax payments, Graham (2000) estimates corporate marginal tax rates with simulation methods. These tax rates vary with the firm-specific effects of tax-loss carrybacks and carry forwards, investment tax credits, the alternative minimum tax, non-debt tax shields, the progressive statutory tax schedule, and earnings uncertainty.
The second reason that τ_C can vary is that the effective tax rate is a function of debt and nondebt tax shields. As a firm increases its interest or other deductions, it becomes less likely that the firm will pay taxes in any given state of nature, which lowers the expected benefit from an incremental deduction. At the extreme, if a firm entirely shields its earnings in current and future periods, its marginal tax rate is zero, as is the benefit from additional deductions. This implies that each naira of interest should be valued with a tax rate that is a function of the given level of tax shields. As explained next, τ_c defines the tax benefit function, and therefore the fact that τ_c is a decreasing function of interest expense affects the estimate of the tax benefits of debt in important ways.

Graham (2000) estimates the tax benefits of debt as the area under the tax benefit function. To estimate a benefit function, first calculate a tax rate assuming that a firm does not have any interest deductions. This first tax rate is referred to as $MTR_{it}0\%$ for Firm *i* in Year *t* and is the marginal tax rate that would apply if the firm's tax liability were based on before-financing income (EBIT, which incorporates zero percent of actual interest expense). Next, calculate the tax rate, $MTR_{it}20\%$ that would apply if the firm hypothetically had 20 percent of its actual interest deductions. He also estimates marginal tax rates based on interest deductions equal to 40, 60, 80, 100, 120, 160, 200, 300, 400, 500, 600, 700, and 800 percent of actual interest expense. (All else is held constant as interest deductions vary, including investment policy. Non-debt tax shields are deducted before interest.) By "connecting the dots," he links the sequence of tax rates to map out a tax benefit curve that is a function of the level of interest deductions. To derive a net (of personal tax effects) benefit function, he connects a sequence of tax benefits that results from running τ through Equation. An interest deduction benefit function can be flat for initial interest deductions but eventually becomes negatively sloped because marginal tax rates fall as additional interest is deducted.

The benefit functions are forward-looking because the value of a dollar of current-period interest can be affected, via the carryback and carry forward rules, by the distribution of taxable income in future years. In addition, future interest deductions can compete with and affect the value of current tax shields. I assume that firms hold the interest coverage ratio constant at the Year-*t* value when they are profitable but maintain the Year-*t* interest level in unprofitable states. For example, assume that income is N500 in Year *t* and interest deductions are N100. If income is forecast to rise to N600 in *t* +1, Graham's assumption implies that interest deductions rise to N120.Alternatively, if income decreases to N400, interest falls to N80. If income is forecast as negative in *t* + 1, interest remains constant at N100 (implicitly assuming that the firm does not have sufficient cash to retire debt in unprofitable states). Likewise, if the firm's income is forecast to be N400 in *t* + 1 and then negative in *t* + 2, Year-*t* + 2 interest deductions are assumed to be N80.

Interesting theoretical analysis and empirical evidence on the impact of taxes on financing decisions are also provided in Doidge & Dyck (2015), Badoer & James (2016) and Barclay & Smith (2020).

1.3. Empirical Review

Here, an attempt is made to document empirical review of capital structure research and the corresponding degree of explained variation (R^2).

TABLE 1: Review of Empirical Capital Structure Research (Selected Papers)

SN	STUDY	METHODOLOGY	MAIN FINDINGS
1	Frank & Goyal (2008, 2009)	Sample: publicly traded American firms excluding financial firms, regulated utilities and firms involved in major mergers over the period 1950-2003. A market-based definition of leverage was used to examine the most important factors affecting leverage. Estimation technique: Panel data Regressions	Factors that explain market leverage are: median industry leverage (+ effect on leverage), market-to-book assets ratio (-), tangibility (+), profitability (-), log of assets (+), and expected inflation (+). In addition, dividend paying firms tend to have lower leverage. Contrary to the pecking order model, net equity issues track the financing deficit more closely than do net debt issues. While large firms exhibit some aspects of the pecking order behavior, the evidence is not robust to the inclusion of conventional leverage factors, nor to the analysis of evidence from the 1990s.
2	Abor (2008)	Sample consists of publicly quoted firms, large unquoted firms and small and medium enterprises (SMEs) in Ghana. Panel data regression techniques were utilized for the study.	Quoted and large unquoted firms exhibit significantly higher debt ratios than do SMEs; and there is no significant difference between the capital structures of publicly quoted firms and large unquoted firms. In addition, firm-specific factors that influence capital structure decisions include firm age, size, asset structure, profitability, risk and managerial ownership.
3	Hartmann-Wendels, Stein & Stoter (2012)	Using a sample of 80,000 German firms over the period of 1973-2008, the authors utilized OLS pooled regressions to examine the determinants of leverage. Graham's marginal tax rate approach was utilized to capture the tax effects on capital structure.	Empirical result documents a significant positive relationship between the marginal tax benefit of debt and the debt ratio of German firms. After controlling for conventional leverage determinants, they find that a 10% increase in the marginal tax benefit of debt at the corporate level (investor level) causes a 1.5% (1.6%) increase in debt ratio, *ceteris paribus*. This positive relation was also shown to be present in various alternative specifications (like changes in debt levels or net increase of debt) and in a partial adjustment model.
4	Strebulaev & Yang (2013)	Sample: US non-financial companies in CRSP Compustat data base for period 1962-2009. Zero leverage firms are	Paper presents puzzling evidence that a substantial number of large public nonfinancial US firms follow a zero-debt or almost zero- debt policy. On average, 10.2% of such firms have zero leverage and almost 22% have less than 5% book leverage ratio.

		firms with zero book debt i.e. both short- and longterm debt equal zero. OLS Regressions and Logit Regressions were utilized.	Neither industry nor size can fully explain such behavior. More surprising is the presence of a large number of these that pay dividends. Zero- leverage dividend paying firms are more profitable, pay higher taxes and have higher cash balances than their proxies chosen by industry and size. These firms are also more liberal in their dividend payout than their proxies and thus payout ratio is relatively independent of leverage.
5	Gathogo & Ragui (2014)	Sample firms include public quoted firms, large unquoted firms and SMEs. Panel Data Regression techniques were utilized	Firm-specific factors exert the following influences on capital structure choice viz: size (+ve), age (+ve), profitability (-ve), liquidity (-ve), cost of debt (-ve), business risk (- ve) and industry type (-ve).
6	Begenau & Salomao (2019)	Examined financing decisions of US public quoted firms under a dynamic trade-off model. The study utilized dynamic panel data models	Large mature firms finance with debt and payout equity during booms. Smaller unprofitable firms must deal with higher financing frictions because they are riskier and at the same time have higher funding needs. Small firms adhere to procyclical financing policy for both debt and equity. Large firms generally substitute between debt and equity over financing cycles.
7	Antill & Grenadier (2019)	US public firms using dynamic models of optimal capital structure in the presence of default costs	The off-equilibrium threat of costly reorganization can exert downward pressure on leverage with liquidation in equilibrium. If reorganization is less efficient than liquidation, the reorganization option reduces shareholders wealth *ex ante*.
8	Elkamhi & Salerno (2020)	Examined Canadian public firms using a dynamic trade-off model of capital structure	The authors found that pre-default costs are on average equal to 6.5% of firm value per year, which translates into approximately 5.5% of the ex ante firm value. Accounting for pre-default costs significantly improves the portability of the trade-off model.

Source: Updated from Paseda (2016)

II. Methodology

Data and Sample

The research is structured to the use of *secondary data* obtained from various sources. The use of secondary data provides a systematic and empirical solution to research problems, by using data which are already in existence. Data validation is a second-order concern. For instance, the examination of audited financial statements of the selected firms provides a basis for subjecting the theoretical hypotheses to reliable and robust empirical tests. Data for the study were obtained from both public and private sources. Official sources such as the Nigerian Stock Exchange (NSE) and Central Bank of Nigeria (CBN) publications were veritable sources of data for this research. The data relating to market conditions were obtained from the daily official list of the Stock Exchange. Macroeconomic data were obtained from the CBN Statistical Bulletins and Annual Reports and Accounts (various years). The final selection was in favour of companies with the highest data availability.

The population for this study is the number of quoted companies in Nigeria, whose equities are listed on the Nigerian Stock Exchange (NSE) for the period 1999-2014. The number of such listed (quoted) equities was 221 as at December 2014. Equities are listed under 20 broad industry sectors.

Some adjustments are necessary to derive our sample. First, the sample excludes financial services sector because they are subject to specific rules (e.g. Banks and Other Financial Institutions Act (BOFIA, 1991)) and special high-leverage nature of financing is severely affected by exogenous factors (Miller, 1995). Therefore, following empirical pattern (such as Rajan & Zingales, 1995), the paper focuses exclusively on non-financial corporations. Second, the necessary data for many of the smaller firms on the NSE could not be collected. This adjustment leaves us with a balanced panel of 50 firms over the 1999-2014 period. The year 1999 was chosen as a start year to coincide with the release of the Investment and Securities Act (ISA) 1999 under the then new democratic regime in Nigeria while 2014 was chosen as end-year as an attempt to update the data. However, the sample for this study was biased towards a survivalist approach, because given the study period of 1999-2014, some companies' financial results were missing. There is stratification of sample in terms of companies selected for the study as displayed in table 2 below.

Table 2: DISTRIBUTION OF SAMPLE OF STUDY

S/N	Sector	Population	Sample	Sample-to-population ratio (%)
1	Agriculture	6	4	66
2	Aviation/Airline	2	1	50
3	Automobile & Tyre	3	2	66
4	Breweries	7	3	43
5	Building Materials	7	3	43
6	Chemical and Paints	9	4	44
7	Computer	6	1	17
8	Conglomerate	8	4	50

9	Construction/Real	6	3	50
10	Engineering	3	1	33
11	Food and Beverages	18	6	33
12	Health Care	12	5	42
13	Hotels and Tourism	4	1	25
14	Industrial/Domestic	10	4	40
15	Oil and Gas	9	5	56
16	Packaging	8	0	0
17	Publishing	4	2	50
18	Road Transport	1	1	100
19	Textiles	3	0	0
	TOTAL	126	50	40

Source: *Underlying Data from the Nigerian Stock Exchange Factbooks (Various Years).*

The researcher is of the opinion that the sample is a representative data and there is no reason to believe that sample selection biases affected the results.

Estimation Procedures

Panel data regression techniques are utilized for the study. Model Specification
Following empirical approaches therefore,

The implicit model can be expressed thus: MODEL I: Impact of Taxation –
$D_{it}=f(MTR_{it},NDTS_{it}, SIZE_{it}, TANG_{it}, GROWTH_{it}, VOL_{it},PROF_{it},R\&D_{it},QUICK_{it},DIV_{it},DEF_{it})$ (7)

Explicitly, with **X** as vector of explanatory variables,

$$D_{it} = \beta_0 + \beta_x \mathbf{X}_{it} + \varepsilon \quad (8)$$

H_{02}: $\beta_{MTR} = 0$; H_{12}: $\beta_{MTR} \neq 0$. Trade off theory especially predicts $0 < \beta MTR < 1$.

H_{01}: β's = 0; alternatively, H_{11}: β's$\neq 0$.

Where D_{it} represents the leverage measure for firm *i* at time *t*. For all the variables, except expected inflation, the subscripts *it* can be interpreted that each exogenous factor is for firm *i* at time *t*. The independent variables could be taken contemporaneously or lagged one period. Both methods are acceptable in empirical corporate finance.

Debt ratio defined as "the ratio of total liabilities to total liabilities plus equity" is the chosen leverage measure for this study. This measure is equivalent to the "total liabilities to assets ratio" being advocated in Welch (2015). Three measures of debt ratio are employed namely: Book Leverage, Market leverage capturing only financial liabilities ($ML1_t$) and Market leverage capturing all liabilities in the balance sheet ($ML2_t$). $ML1_t$ is the financial leverage ratio while $ML2_t$ is the total leverage ratio. All the chosen leverage measures are stock-based methods. Because of space constraint, all the explanatory variables are defined in Table 3. The regression parameters (β's) are stated in column five of Table 3.

NDTS represents non-debt tax shield inspired by DeAngelo & Masulis (1980).

SIZE represented by the natural log of sales (LNS). LNS is a common proxy for firm size. *TANG* represents the tangibility of the firm's assets, a collateral measure of debt capacity. *GROWTH* is measured by the market-to-book value of the firm's stock, a measure of growth opportunities of the firm. An alternative measure is the *Q* ratio measured as the market-to-book value of the firm's assets.
VOL is the volatility of earnings or liquid assets, a measure of business risk (for example, as in Choi & Richardson, 2016)

PROF represents profitability, measured by the Return on Assets (ROA).

R&D means research and development expenditure (scaled by total assets), a proxy for uniqueness of assets and also intangibility of assets. *UNQ* for asset uniqueness. A business risk proxy for the industry.

DEF is a measure of financing deficit, i.e., requirement for external finance because retained earnings are insufficient to cater for planned capital expenditures.

The financing deficit term is an added factor as inspired by Frank & Goyal (2008) and utilized subsequently by other scholars to test the pecking order theory.

QUICK represents the quick or acid test ratio. A stricter measure of liquidity relative to the current ratio.

DIV represents dividend payout ratio. *Dividend-paying status* of firms is a critical factor that underscores the degree of information asymmetry between insiders and outside financiers. It also captures agency effects in financing decisions. Used in Barakat and Rao (2013) to underscore the relative importance of dividend income vis-à-vis interest income.

Et represents expected inflation, the only macroeconomic factor to be included in the model. Frank

& Goyal (2009) provide strong evidence in support of a positive relationship between leverage and expected inflation.

The **null hypothesis** is that the β's are not significantly different from zero, i.e., H_{01}: β's = 0; alternatively, H_{11}: β's≠ 0. In other words, firm-specific characteristics do not exert significant impact on corporate debt ratios.

The influence of less important (explanatory) factors is taken into account by the introduction in the Equation (9), a random variable, usually denoted by "ε" or "u".

$D_{it} = \beta_0 + \beta MTR + \beta_x \mathbf{X}_{it} + \varepsilon$ (10) Where: D_{it} represents the leverage measure for firm *i* at time *t*.

MTR_{it} stands for the marginal tax rate of firm *i* at time *t* MTR is defined as taxes paid divided by earnings before tax as in Barakat & Rao (2013). All other variables are as defined in Model I.

To capture tax effect, Equation (9) regresses the leverage measure against the marginal tax rate and other conventional set of factors.

Graham's (2000) tax benefit methodology is also employed here to capture the magnitude of the tax benefits of debt in Nigeria. The detailed methodology for estimating corporate marginal tax rates are captured in Appendix A of Graham's (2000:1935-1938) paper.

Definition of Variables

Table 3: Determinants of Capital Structure and their Expected Signs and Magnitudes

S/N	EXPLANATORY VARIABLE	DEFINITION	INDICATION	EXPECTED SIGN	EXPECTED MAGNITUDE
1	MTR	Marginal tax rate, Tax expense divided by Earnings before tax as in Barakat and Rao (2013).	Effect of debt tax shield	+	$0 < \beta_{MTR} < 1$
2	NDTS	Non-debt tax shield, following DeAngelo and Masulis (1980), (Depreciation+ Investment tax credit)/ Total assets less current liabilities	Substitute for the debt tax shield	-	$-1 < \beta_{NDTS} < 0$
3	TANG	Tangible assets defined as PPE divided by total assets less current liabilities.	Collateral, a measure of debt capacity.	+/-	$-1 < \beta_{TANG} < 1$
4	GROWTH	Growth opportunities, measured by the ratio of market-to-book value of the firm or market to book value of equity.	Growth	-	$-1 < \beta_{GROW} < 0$
5	SIZE	Size defined as the natural logarithm of Sales (LNS)	Size effect	+	$0 < \beta_{SIZE} < \infty$
6	VOL	Volatility of earnings defined as the standard deviation of EBIT scaled by Total Assets less current liabilities	Business Risk	-	$-1 < \beta_{VOL} < 0$

7	PROF	Defined by ROCE or ROA = Earnings before Interest and Taxes/ Total Assets less current liabilities	Profitability	+/-	$-1 < \beta_{PROF} \leq 1$
8	QUICK	A stricter measure of liquidity relative to current ratio. Quick ratio is defined as Current assets less inventory divided by current liabilities	Liquidity	+/-	$-1 < \beta_{QUICK} \leq 1$
9	R&D	Research & Development plus other intangible assets / (Total Assets – Current Liabilities)	Asset Uniqueness or intangibility	-	$-1 < \beta_{RD} < 0$
10	DEF	Financing deficit = change in total assets+ dividends - profit after tax OR net decrease in cash and cash equivalents scaled by (Total assets less current liabilities).	Adverse selection in external financing	+	$0 < \beta_{DEF} \leq 1$ OR $\beta_{DEF} = \beta_{PO} = 1$
11	DIV	Dividend payout ratio defined as Dividends divided by Profit after tax (PAT) or Dividend per share (DPS) divided by Earnings per share (EPS).	1) Asymmetric information. Low payout firms will prefer debt over equity financing.	-	$-1 < \beta_{DIV} < 0$
		This variable was utilized in Barakat and Rao (2013)	2) Effect of personal taxes – relative advantage of dividend to interest income		
12	**E**	Expected inflation proxied by the treasury bill rate	Impact of macroeconomic conditions on financing.	+	$0 < \beta_{INF} < 1$
13	AGE	Ln (Number of years since incorporation).	Impact of the firm's age on financing decisions. AGE may be correlated with SIZE.	+	$0 < \beta_{AGE} < 1$
14	$(D_{it}^{*} - D_{it-1})$	Target adjustment in debt ratios, measured as target debt ratio minus lagged debt ratio. Target debt ratio can be proxied by historical average or industry median leverage where available.	Target behavior in financing. $\beta_{TA} > 0$ – target behavior holds $\beta_{TA} < 1$ - +ve adjustment costs. Chang & Dasgupta (2009).	+	$0 < \beta_{TA} < 1$
15	UNQ	Uniqueness dummy (for distress risk) that takes the value of one for firms producing computers, semiconductors, chemicals and allied, aircraft, space vehicles and other sensitive industries, and zero otherwise.	Asset uniqueness/ Industry uniqueness.	-	$-1 < \beta_{UNQ} < 0$

Source: Paseda (2016)

III. Empirical Results

This section presents the empirical analysis and results of the study. Again, the research aim is to investigate the impact of taxes on the capital structure decisions of Nigerian quoted firms. Beginning from the summary statistics in table 4, the nature of the variables are described. The regression results follow in tables 5-7. The tax benefit tables are displayed in tables 8-11.

TABLE 4: SUMMARY STATISTICS OF VARIABLES USED IN THE STUDY

VAR	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	Jarque-Bera
BLT	0.6870	0.6053	9.2630	-0.3396	0.5595	8.1587	100.46	16255616.00
ML1T	0.2729	0.1902	0.9959	0.0000	0.2605	0.8387	2.64	4903.77
ML2T	0.4656	0.4284	0.9970	0.0525	0.2558	0.3316	1.97	2495.79
MTR	0.2855	0.3016	13.3333	-16.3462	1.0649	2.0583	153.92	37944563.00
NDTS	0.1179	0.0771	1.3270	-0.9339	0.1547	2.3142	18.39	429669.30
TANG	0.6241	0.6350	3.0970	-4.5480	0.5432	-2.8335	30.96	1355217.00
GROW	1.6307	1.7763	96.4290	-1090.00	40.2090	-25.2730	681.22	770000000
SIZE	15.2322	15.4420	20.2930	0.0000	2.9717	-2.5688	13.60	231119.40
VOL	0.5036	0.1062	16.4410	-2.2449	2.1285	6.3166	42.23	2826856.00
PROF	0.2133	0.2147	4.7059	-8.3240	0.6764	-4.2574	60.14	5556220.00
QUICK	0.6925	0.6279	2.9950	0.0000	0.4181	1.7562	7.85	59735.46
RD	0.0225	0.0000	0.8929	0.0000	0.0971	6.3678	47.35	3544312.00
UNQ	0.6195	1.0000	1.0000	0.0000	0.4855	-0.4924	1.24	6756.17
DEF	0.2103	0.1331	14.2350	-4.3168	0.8064	7.4961	132.76	28402908.00
DIV	0.4150	0.3723	7.0833	0.0000	0.4746	4.5288	55.21	4674762.00
EINF	0.1119	0.1177	0.1888	0.0400	0.0401	0.0681	2.21	1075.42
AGE	3.7149	3.7612	4.5109	0.3367	0.4040	-1.8264	11.37	138787.60
DDTA	0.0031	-0.0011	1.7132	-4.6197	0.3464	-4.2622	56.51	4887965.00

SOURCE: Author's Computation from Microsoft Excel.

TABLE 5: LEVERAGE REGRESSIONS

DEP. VAR.	**BLT**			**ML1T**			**ML2T**		
EXP.VAR	COEFF.	STD.ERR	t-STAT	COEFF.	STD.ERROR	t-STAT	COEFF.	STD.ERROR	t-STAT
C	0.4873	0.008258	59.01681	0.789403	0.010381	76.04495	0.487334	0.008258	59.01681
BLT(-1), ML1T(-1), ML2T(-1)	0.7496	0.000405	1852.684	0.735424	0.000558	1317.096	0.749564	0.000405	1852.684
MTR	-0.0007	0.000130	-5.706789	-0.004102	0.000149	-27.61393	-0.000743	0.000130	-5.706789
NDTS	0.1114	0.000568	196.0501	0.050328	0.000889	56.61995	0.111402	0.000568	196.0501
TANG	-0.0274	0.000175	-156.4958	-0.019523	0.000202	-96.75458	-0.027389	0.000175	-156.4958
GROW	-1.93E-05	1.23E-05	-1.560318	-5.04E-05	1.25E-05	-4.038616	-1.93E-05	1.23E-05	-1.560318
SIZE	-0.0038	4.05E-05	-93.95959	-0.011532	7.82E-05	-147.5077	-0.003806	4.05E-05	-93.95959
VOL	0.0002	6.95E-05	3.202441	-0.007034	7.77E-05	-90.49038	0.000223	6.95E-05	3.202441
PROF	-0.0172	0.000227	-75.90996	-0.007896	0.000150	-52.61294	-0.017206	0.000227	-75.90996
QUICK	-0.0403	0.000229	-176.0211	-0.049549	0.000204	-243.3950	-0.040295	0.000229	-176.0211
RD	0.0872	0.001142	76.35822	0.134748	0.001303	103.3826	0.087203	0.001142	76.35822
UNQ	0.0151	0.000149	101.4586	-0.005559	0.000194	-28.70477	0.015089	0.000149	101.4586

DEF	-0.0093	0.000137	-67.69795	-0.011206	0.000278	-40.31463	-0.009253	0.000137	-67.69795
DIV	-0.0407	0.000181	-224.9471	-0.036335	0.000232	-156.8584	-0.040677	0.000181	-224.9471
EINF	0.6453	0.010643	60.63348	0.908912	0.016686	54.47209	0.645301	0.010643	60.63348
AGE	0.0098	0.000176	55.62885	0.010347	0.000255	40.64010	0.009789	0.000176	55.62885
DDTA	0.0168	0.000354	47.49500	-0.009761	0.000360	-27.10674	0.016825	0.000354	47.49500
ADJ. R^2	0.9998			0.999206			0.999770		
ADJ. R^2 (UNWEIGHTED)	0.3154			0.676300			0.71998		
S.E. of Reg	0.4479			0.144244			0.132063		
F- Stat	819052			1792697.			6190619.		
Prob (F-Statistic)	0.0000			0.000000			0.000000		
Durbin-Watson.	2.0784			1.94244			1.9725		

Source: Author's analysis. * and ** indicate significance at 1% and 5%

From the summary statistics in Table 4 above, several facts can be deduced as statistical features of the variables utilized for the study. First, the relationship between the three measures of leverage is revealing of the relative weights of financial to non-financial debt in corporate balance sheets. For instance, the relative ***means*** of market leverage measure I which captures only financial liabilities relative to book leverage is suggestive that over 60 percent of corporate liabilities are non-financial. In order words, book leverage ratios are often 2.55 times as high as market-based leverage ratio I (ML1). The magnitude of book leverage over market leverage is most pronounced in firms and industries where the book equity is depressed or even negative ((e.g., agriculture, automobile and breweries (2005-2007)) The relative ratio of Market leverage I to Market Leverage II suggests a lower percentage of non-financial liabilities at 43 percent. The conventional reason for higher book-based leverage measure relative to market-based leverage measure is that the book values of equity might, on average, be less than the market values of equity. This notion does not hold in Nigeria because for many of the sample firms, their market equity were less than the book equity for most of the study period. The relative ratios of the leverage ***median*** statistics reveal that non-financial liabilities could in fact be representing 69 percent of corporate liabilities when ML1 and BL are compared. However, the comparison between ML1 and ML2 median values moderates the proportion of non-financial liabilities to total corporate liabilities to 56 percent. Thus, before any rigorous analysis, it is clear that non-financial liabilities are significant sources of financing for modern corporations in Nigeria.

Further, the comparison between minimum and maximum values of leverage indicates that there is wide heterogeneity in how Nigerian listed firms are financed while some firms did not utilize financial debt for some or nearly through the study period, given the zero minimum value. The heterogeneity is also buttressed by the **standard deviation** of book leverage. Specifically, the size factor plays a role in the relative mix of financial and non-financial obligations. Large firms tend to have relatively more of their total liabilities in financial obligations than small firms. Moreover, large firms tend to have relatively less of their total debt in short-term obligations than small firms. Small firms rely disproportionately more on trade credit and delay (or lag) in meeting obligations to employees and other non-financial stakeholders.

Firm characteristics can be ranked in this order in terms of their mean values namely: Size, firm age, growth opportunities, liquidity as measured by acid-test or quick ratio, asset tangibility, uniqueness, volatility, dividend payout policy (in terms of high versus low payout), profitability, financing deficit, non-debt tax shield, and Research and Development (R&D). Among the firm factors, the R&D showed the least dispersion around the mean as can be observed from its standard deviation.

Table 6: Regression Results of the Impact of Firm Characteristics on Book Leverage (BL) Ratio.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.876872	0.001206	726.9440	0.0000
BLT(-1)	0.407608	0.000372	1096.007	0.0000
NDTS	0.026711	0.001442	18.52950	0.0000

TANG	-0.115164	0.000238	-484.0764	0.0000
GROW	-1.26E-05	1.05E-05	-1.205408	0.2281
SIZE	-0.047144	5.64E-05	-836.3237	0.0000
VOL	-0.046709	6.46E-05	-722.5965	0.0000
PROF	-0.028882	0.000345	-83.80961	0.0000
QUICK	-0.208931	0.000245	-853.1059	0.0000

RD	0.146785	0.001284	114.3394	0.0000
UNQ	-0.119176	0.000218	-547.2867	0.0000
DEF	0.061986	0.000392	158.3106	0.0000
DIV	-0.060888	0.000315	-193.5494	0.0000
EINF	0.200743	0.001893	106.0477	0.0000
AGE	0.148642	0.000283	525.9575	0.0000
	Weighted Statistics			
R-squared	0.998434	Mean dependent var		11.07570
Adjusted R-squared	0.998433	S.D. dependent var		53.92684
S.E. of regression	0.461677	Sum squared resid		8511.954
F-statistic	1818397.	Durbin-Watson stat		1.182224
Prob(F-statistic)	0.000000			
	Unweighted Statistics			
R-squared	0.302536	Mean dependent var		0.688574
Sum squared resid	8750.866	Durbin-Watson stat		2.064550

**Significant at 1% and 5%

From the above results in Table 6, all the variables, except growth, are significant at 1 percent significance level. Debt usage is a declining function of tangibility (TANG), growth opportunities (GROW), size (SIZE), volatility of earnings (VOL), profitability (PROF), liquidity (QUICK), uniqueness of industry (UNQ) and dividend payout ratio (DIV). Book leverage increases with non- debt tax shields (NDTS), asset intangibility (RD), financing deficit, age and expected inflation (EINF). The signs and magnitude of the coefficients are more consistent with the pecking order theory than the trade-off theory of financing in terms of the number of coefficients tally with theoretical prediction. More specifically, the (negative) signs of the coefficients of profitability, liquidity, tangibility, size and financing deficit are consistent with the *pecking order* while the *trade-off* predicts otherwise. The positive relationship between leverage and non-debt tax shields is inconsistent with the debt substitution hypothesis of DeAngelo-Masulis (1980) framework.

Rather, the positive relation might be indicative of the collateral value of assets. The availability of alternative tax shelters does not reduce the tax-incentives to borrow. The inverse relationships between leverage and tangibility as well as leverage and size are consistent with *agency effects* wherein smaller firms with less tangible assets voluntarily choose higher debt levels to limit consumption of perquisites. In addition, the expected inflation as a proxy of macroeconomic conditions has a positive relation with leverage. Expectations of decline in the purchasing power of the naira exerts upward pressure on corporate borrowing behaviour, thus aggressive debt usage by firms would be consistent with the wealth-redistribution effect of inflation. At inflationary periods, the time value of money reduces the value of liabilities *ceteris paribus*, that is, borrowers gain while lenders lose. However, it is clear that the coefficient of multiple determination (R^2), which is the statistical measure of the *goodness of fit* of the regression, is abysmally low at 30 percent. The Durbin-Watson test for serial correlation of variables is, however, satisfactory at 2.06. The inclusion of the lag of the dependent

variable helps to overcome the problem of autocorrelation. Given low R^2, the model requires modification to period-weighted regression in order to produce meaningful analysis of capital structure choice by Nigerian firms.

Table 7: Determinants of Capital Structure- Market Leverage 1 Regression I

Market Leverage 1 is defined as the market value of financial liabilities divided by the sum of the market values of both financial liabilities and equity.

Dependent Variable: ML1T

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.148090	0.009493	15.60071	0.0000
ML1T(-1)	0.729715	0.003217	226.8397	0.0000*
NDTS	0.043586	0.005017	8.687021	0.0000*
TANG	-0.014812	0.001508	-9.823051	0.0000*
GROW	-3.90E-05	1.89E-05	-2.057894	0.0396**
SIZE	-0.009677	0.000461	-20.98867	0.0000*
VOL	-0.003685	0.000555	-6.633788	0.0000*
PROF	-0.007643	0.001152	-6.632157	0.0000*
QUICK	-0.045548	0.001944	-23.43052	0.0000*
RD	0.133656	0.008074	16.55330	0.0000*
UNQ	0.006171	0.001877	3.287893	0.0010*
DEF	-0.010882	0.000980	-11.10641	0.0000*
DIV	-0.041997	0.001736	-24.18540	0.0000*
EINF	0.137145	0.019454	7.049744	0.0000*
AGE	0.029778	0.002106	14.14188	0.0000*
R-squared	0.664573	Mean dependent var		0.273663
Adjusted R-squared	0.664456	S.D. dependent var		0.260540
S.E. of regression	0.150921	Akaike info criterion		-0.943749
Sum squared resid	909.6023	Schwarz criterion		-0.940521
Log likelihood	18866.38	Hannan-Quinn criter. -0.942727		
F-statistic	5651.596	Durbin-Watson stat 1.929436		
Prob(F-statistic)	0.000000			

*Significant at 1%

**Significant at 5%

Table 7 shows that all the variables are significant at 1% except growth which is significant at 5%. Market debt ratio is a declining function of eight explanatory variables namely: tangibility, growth options, size, volatility, profitability, liquidity, financing deficit and dividend payout policy while it increases with non-debt tax shield, asset intangibility (R&D and other intangibles), uniqueness, expected inflation and age. The inverse relationships between leverage and tangibility as well as leverage and size are consistent with *agency effects* wherein smaller firms with less tangible assets voluntarily choose higher debt levels to limit consumption of perquisites.

Market leverage declines with tangibility, size, liquidity, profitability, dividend payout ratio meaning that bigger firms with safe tangible assets and abundant liquid assets borrow less. Sticky dividend policies constrain firms from borrowing when cash flows from operations are insufficient to cater for capital expenditures. Such firms would rather sell marketable securities to retire debt. All these practices are consistent with pecking order financing.

Unweighted R^2 approximates 70 percent, implying that the unaccounted factors capture merely 30 percent of cross-sectional and time-series variation in market leverage.

The Impact of Taxes – Information in the Tax Benefit Curves
Impact of Corporate Income Taxes (MTR) – Leverage Regression

From table 5, leverage declines with the marginal tax rate. Moreover, the R^2 remained unchanged indicating the absence of tax effect on the capital structure decisions of firms. The result contradicts the trade-off model of capital structure which suggests that firms seeking to maximize the value of interest tax shield would borrow more when the tax rate increases, ceteris paribus.

A possible explanation for this inverse leverage-MTR relation is the concept of tax exhaustion. The tax benefit is a function of firm profitability. This brings us to the concept of tax benefit tables. There are three applicable models in tax benefit computation namely: Modigliani-Miller (1963) model, the Miller (1977) model and the Graham (2000) methodology. All three models can be shown to yield equivalent results on tax benefits of debt.

TABLE 8: The Tax Benefit Table – Modigliani and Miller (1963) Model

YEAR	MTR (AVERAGE SAMPLE FIRMS)	DEBT MARKET CAPITALIZATION (N'M)	EQUITY MARKET CAPITALIZATION (N'M)	VALUE OF FIRMS (N'M)	INTEREST TAX SHIELD (N'M)	IMPLIED TAX-TO-VALUE RATIO
1999	0.23	466,716.6	294,500.0	761,216.56	109,676.43	0.14
2000	0.25	585,250.7	466,100.0	1,051,350.70	143,637.51	0.14
2001	0.24	836,861.8	648,400.0	1,485,261.82	200,647.07	0.14
2002	0.28	1,003,186.3	748,700.0	1,751,886.33	279,322.67	0.16
2003	0.29	1,186,404.9	1,325,700.0	2,512,104.87	339,820.80	0.14
2004	0.26	1,533,682.2	1,926,500.0	3,460,182.23	401,607.06	0.12
2005	0.30	2,083,934.6	2,523,500.0	4,607,434.63	616,192.58	0.13
2006	0.28	2,533,362.9	4,227,134.2	6,760,497.05	716,868.14	0.11
2007	0.25	4,142,273.7	10,180,293.0	14,322,566.68	1,026,372.58	0.07
2008	0.28	7,846,893.0	6,957,453.5	14,804,346.51	2,160,072.46	0.15
2009	0.26	9,728,789.9	4,989,390.0	14,718,179.87	2,576,026.64	0.18
2010	0.69	10,481,779.9	7,913,752.2	18,395,532.10	7,203,721.56	0.39
2011	0.66	12,277,777.8	6,532,580.0	18,810,357.83	8,067,133.73	0.43
2012	0.14	16,060,624.3	8,974,448.5	25,035,072.79	2,259,885.26	0.09
2013	0.44	17,175,630.5	13,226,000.0	30,401,630.46	7,481,704.63	0.25
2014	0.20	17,292,517.3	11,477,661.2	28,770,178.47	3,404,561.96	0.12

Source: Author's computations based on data from official sources such as CBN and NSE.

TABLE 9: The Tax Benefit Schedule – Miller's Model Utilizing Nigerian Data

YEAR	MTR (AVERAGE SAMPLE FIRMS)	DEBT MARKET CAPITAL(N'M)	EQUITY MARKET CAPITALIZATION (N'M)	VALUE OF FIRMS (N'M)	PV INTEREST TAX SHIELD (N'M)	PERSONAL TAX PENALTY [TPD-(1-TC)TE]* DEBT	NET GAIN FROM LEVERAGE (N'M)
1999	0.23	466716.56	294500.00	761216.56	109676.43	10967.64	98,708.79
2000	0.25	585250.70	466100.00	1051350.70	143637.51	14363.75	129,273.76
2001	0.24	836861.82	648400.00	1485261.82	200647.07	20064.71	180,582.36
2002	0.28	1003186.33	748700.00	1751886.33	279322.67	27932.27	251,390.40
2003	0.29	1186404.87	1325700.00	2512104.87	339820.80	33982.08	305,838.72
2004	0.26	1533682.23	1926500.00	3460182.23	401607.06	40160.71	361,446.35
2005	0.30	2083934.63	2523500.00	4607434.63	616192.58	61619.26	554,573.32
2006	0.28	2533362.86	4227134.19	6760497.05	716868.14	71686.81	645,181.33
2007	0.25	4142273.69	10180292.98	14322566.68	1026372.58	102637.26	923,735.32
2008	0.28	7846893.01	6957453.50	14804346.51	2160072.46	216007.25	1,944,065.21
2009	0.26	9728789.87	4989390.00	14718179.87	2576026.64	257602.66	2,318,423.98
2010	0.69	10481779.88	7913752.22	18395532.10	7203721.56	720372.16	6,483,349.41
2011	0.66	12277777.83	6532580.00	18810357.83	8067133.73	806713.37	7,260,420.36
2012	0.14	16060624.27	8974448.52	25035072.79	2259885.26	225988.53	2,033,896.73
2013	0.44	17175630.46	13226000.00	30401630.46	7481704.63	748170.46	6,733,534.17
2014	0.20	17292517.30	11477661.17	28770178.47	3404561.96	340456.20	3,064,105.77

Source: Author's computations based on data from official sources such as Central Bank of Nigeria (CBN) and Nigerian Stock Exchange (NSE) Publications (Various Years).

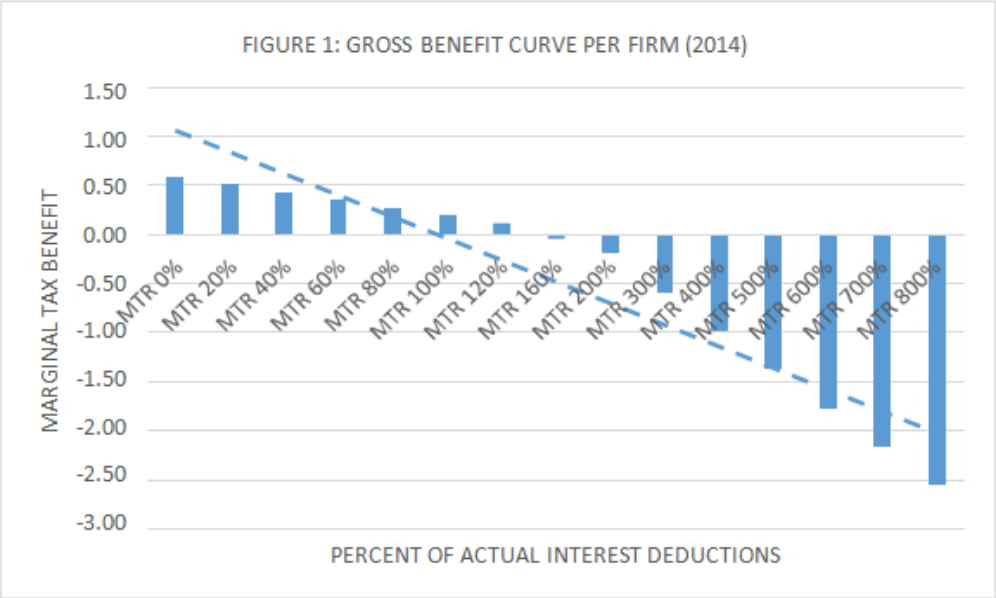
The Tax Benefit Schedules – Graham (2000) Methodology

TABLE 10: Schedule of Marginal Tax Rates per Sample Firm Based on Different Percentages of Actual Interest Deductions for the Period (1999-2014)

YEAR	MTR 0%	MTR 20%	MTR 40%	MTR 60%	MTR 80%	MTR 100%	MTR 160%	MTR 200%	MTR 300%	MTR 400%	MTR 500%	MTR 600%	MTR 700%	MTR 800%
1999	0.51	0.46	0.40	0.35	0.29	0.23	0.07	-0.04	-0.32	-0.60	-0.88	-1.15	-1.43	-1.71
2000	0.28	0.28	0.27	0.26	0.25	0.25	0.22	0.21	0.17	0.13	0.10	0.06	0.02	-0.01
2001	0.41	0.37	0.34	0.31	0.27	0.24	0.14	0.07	-0.09	-0.26	-0.42	-0.59	-0.76	-0.92
2002	2.92	2.39	1.86	1.34	0.81	0.28	-1.31	-2.36	-5.01	-7.65	-10.29	-12.94	-15.58	-18.22
2003	0.91	0.79	0.66	0.54	0.41	0.29	-0.09	-0.34	-0.96	-1.59	-2.21	-2.83	-3.46	-4.08
2004	0.37	0.35	0.33	0.31	0.28	0.26	0.20	0.15	0.04	-0.07	-0.17	-0.28	-0.39	-0.50
2005	0.43	0.40	0.37	0.35	0.32	0.30	0.22	0.16	0.03	-0.10	-0.23	-0.37	-0.50	-0.63
2006	0.32	0.31	0.30	0.30	0.29	0.28	0.26	0.25	0.22	0.18	0.15	0.12	0.09	0.05
2007	0.35	0.33	0.31	0.29	0.27	0.25	0.18	0.14	0.04	-0.07	-0.18	-0.28	-0.39	-0.49
2008	0.43	0.40	0.37	0.34	0.31	0.28	0.18	0.12	-0.04	-0.19	-0.35	-0.51	-0.66	-0.82
2009	0.54	0.49	0.43	0.38	0.32	0.26	0.10	-0.01	-0.29	-0.56	-0.84	-1.12	-1.39	-1.67
2010	1.02	0.96	0.89	0.82	0.75	0.69	0.49	0.35	0.02	-0.32	-0.66	-0.99	-1.33	-1.66
2011	1.52	1.35	1.18	1.00	0.83	0.66	0.14	-0.21	-1.07	-1.93	-2.80	-3.66	-4.52	-5.39
2012	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.13	0.13	0.13	0.12	0.12
2013	1.82	1.57	1.31	1.06	0.80	0.54	-0.22	-0.73	-2.01	-3.28	-4.56	-5.84	-7.11	-8.39
2014	0.59	0.51	0.43	0.35	0.28	0.20	-0.04	-0.20	-0.59	-0.98	-1.37	-1.77	-2.16	-2.55

Source: Author's Computation. Please note that the simulation extends to 800% of actual interest deductions.

FIGURE 1: GROSS BENEFIT CURVE PER FIRM (2014)



Interpretation: Gross benefits equal the area under each firm's gross benefit curve (up to the point of actual interest expense), aggregated across firms. Gross benefits measure the reduction in corporate and state tax liabilities occurring because interest expense is tax deductible. Net benefits would equal gross benefits minus the personal tax penalty. That is, net benefits are reduced to account for the fact that firms must pay a higher risk-adjusted return on debt than on equity, to compensate them for their relative personal tax disadvantage. The *Total* and *Per Firm* columns express the annual tax benefits of debt. The *Percent of Firm Value* columns express the capitalized tax benefit of debt aggregated across firms, expressed as a percentage of aggregate firm value. The *Zero Benefit* is the amount of interest for which the marginal tax benefit of debt equals zero, expressed as a proportion of actual interest expense. *Kink* is the amount of interest where the marginal benefit function becomes downward sloping, expressed as a proportion of actual interest expense. Assuming there are 12000 firm-level observations for the simulated marginal tax rates up to 100% of actual interest deductions, then the aggregate tax benefit schedule should approximate that presented below.

TABLE 11: The Aggregate Tax Benefits of Debt in Nigeria- Graham Methodology

YEAR	GROSS BENEFITS (N'M)	GROSS BENEFIT PER FIRM (N'M)	PERCENT OF FIRM VALUE CAPITALIZED	NET BENEFITS (N'M)	NET BENEFIT PER FIRM (N'M)	PERCENT OF FIRM VALUE CAPITALIZED	ZERO BENEFIT	KINK	N (2000*6)
1999	109676.43	9.14	0.14	98708.79	8.23	0.13	1.85	0.20	12000
2000	143637.51	11.97	0.14	129273.76	10.77	0.12	7.67	0.40	12000
2001	200647.07	16.72	0.14	180582.36	15.05	0.12	2.44	0.80	12000
2002	279322.67	23.28	0.16	251390.40	20.95	0.14	1.11	0.20	12000
2003	339820.80	28.32	0.14	305838.72	25.49	0.12	1.46	0.40	12000
2004	401607.06	33.47	0.12	361446.35	30.12	0.10	3.36	0.40	12000
2005	616192.58	51.35	0.13	554573.32	46.21	0.12	3.23	0.80	12000
2006	716868.14	59.74	0.11	645181.33	53.77	0.10	9.20	0.80	12000
2007	1026372.58	85.53	0.07	923735.32	76.98	0.06	3.36	0.80	12000
2008	2160072.46	180.01	0.15	1944065.21	162.01	0.13	2.75	0.70	12000
2009	2576026.64	214.67	0.18	2318423.98	193.20	0.16	1.96	0.60	12000
2010	7203721.56	600.31	0.39	6483349.41	540.28	0.35	3.06	2.07	12000
2011	8067133.73	672.26	0.43	7260420.36	605.04	0.39	1.76	1.30	12000
2012	2259885.26	188.32	0.09	2033896.73	169.49	0.08	24.00	16.00	12000
2013	7481704.63	623.48	0.25	6733534.17	561.13	0.22	1.43	0.85	12000
2014	3404561.96	283.71	0.12	3064105.77	255.34	0.11	1.50	0.81	12000

Source: Author's Computation.

IV. Implications of the Empirical Results

First, the insignificant MTR coefficient implies that taxes are not first-order concern of CFOs in setting corporate debt policies in Nigeria. Second, the average Kink values for the period from

1999 to 2009 appear to signify debt aggressiveness while those of 2010 to 2012 signify debt conservatism. The kink values for 1999-2009 appear inconsistent with the average debt ratio levels which are lower than a trade-off model would predict given the signs of the coefficients of the explanatory variables which contradict trade-off theory's predictions. To reconcile the seeming inconsistency may require imposing an additional assumption on the relationship between Kink values and debt appetite.

V. Summary and Conclusion

The weakness of the marginal tax factor in rationalizing the corporate debt choice of Nigerian quoted firms is revealed by the panel data regressions and specifically through comparison of R^2 from the estimation without MTR with that from the MTR-inclusive estimation. The weak tax effect argument, however, is not supported by the quantum of corporate values attributable to tax from different financial models of estimating the tax benefits of debt namely, the Modigliani- Miller (1963) approach, the Miller's equilibrium and the Graham's (2000) methodology. The Kink is a measure of debt conservatism whereby a less-than-one kink implies that firms are using debt aggressively. A greater than one kink means debt conservatism. Most large, liquid and profitable firms are significantly less levered relative to their theoretical debt capacity. In terms of the magnitude of tax benefits, the greatest within the sample period occurred in 2011 at gross (net) benefits of 43 percent (39 percent). The least tax benefit occurred in 2007 at gross (net) benefit of

7 percent (6 percent). Personal tax disadvantage on debt merely partially offsets the corporate tax shield benefit rather than fully offset the latter as in the original Miller equilibrium. In terms of the interaction of taxes with pecking order and the trade-off models, the study finds that taxes are not a first order consideration in the choice of debt ratios. Financing deficit rationalizes debt ratios on average. There is no empirical support for the use of debt to minimize corporate tax bill or beef up corporate value. In addition, there is support for the existence of target debt ratios in Nigerian corporate environment. Debt ratios are not merely affected by random influences. Thus, if managers claim to have target debt ratios, the empirical evidence here validates such claims and, in fact, reveals that the typical sample firm adjusts to its target within a period of 2 years and four months. Dynamic models of capital structure choice that, for instance, incorporate lagged values of the debt ratios of firms perform better. The dynamic models can incorporate aspects of the competing theories of capital structure as attempted in this study.

In Nigeria, corporate borrowing is explained better by asymmetric information than by tax-induced frictions in the financial system. This is revealed by the signs of the relations between leverage and conventional factors such as asset tangibility, earnings volatility, dividend payout ratio, liquidity, profitability, size and industry uniqueness.

Non-debt tax shelters play a fairly minor role in capital structure choice. The study could not establish any inverse relation between leverage and non-debt tax shields (such as depreciation, amortization, investment allowances, tax-loss carry forwards and backwards, etc). This research has documented the minor role played by non-debt tax shelters in the capital structure of Nigerian firms. Non-debt tax shields underscore the collateral value of the assets of corporations rather than acting as debt tax-shield substitutes. As far as is known, the study is also the first to attempt an estimation of the tax benefits of debt in Nigeria using the Graham simulation of different percentages of actual interest deductions in order to ascertain debt conservatism or aggressiveness (Kink) and quantifying the margin with which debt can be increased until the marginal tax benefit vanishes (Zero Benefit).

In addition, the government at both federal and state levels should simplify tax administration in order to induce compliance of both companies and individuals in the discharge of their respective civic responsibilities. In this regard, the time-honoured principles of effective taxation as propounded by Adam Smith should remain the guiding light viz: *proportionality to income* or *ability to pay*; *certainty* rather than arbitrariness; *convenience* to tax payers; and *economy* in administration and collection.

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