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ABSTRACT

Perhaps, the most familiar idea underlying debt maturity choice is the maturity-matching hypothesis wherein liabilities' maturities correlate with assets' maturities. However, the maturity-matching hypothesis does not provide a comprehensive explanation for many empirical patterns of firm behavior. This study investigates the determinants of debt maturity choice using a panel of 50 Nigerian quoted firms between 1999 and 2014. Using simple correlation analysis and dynamic panel data regression techniques, the study documents the following findings. First, the marginal tax rate exerts positive influence on the use of short-term borrowing perhaps because firms exploit potential tax benefits of borrowing through the short-term channel, consistent with the tax hypothesis. Second, small firms with fewer tangible assets tend to utilize more short-term borrowing. This effect is more pronounced in unique industries and for dividend payers. Third, growth opportunities exert a weak positive influence on the use of short-term borrowing thus implying that short-term debt may play minor role in ameliorating the agency cost of underinvestment. However, firms with more volatile earnings and less liquid assets utilize less short-term borrowing. Finally, macroeconomic variables exert significant influences on the debt maturity choice with monetary policy and government debt wielding positive effects while private credit, term spread and economic growth have inverse effects. The findings generate important implications along four non-mutually exclusive views of debt maturity such as signaling, contracting-costs, tax and liquidity hypotheses. The study recommends corporate debt and macroeconomic policies that promote prudent use of debt maturities.

Keywords: Debt maturity, Contracting-cost hypotheses, Signaling hypotheses, Tax hypotheses, Liquidity risk hypotheses.

JEL: G30, G32.

1. INTRODUCTION

The debt maturity choice is one of several financing choices that a firm must make simultaneously. When deciding how to finance itself, the firm must choose between debt and equity. If it chooses debt, then it must also decide the

maturity of debt (Mian & Santos, 2017), its priority, whether the debt is foreign-currency or local-currency denominated, whether private or public debt, fixed or floating rate, whether bank debt or capital market (Parise, 2017), and other contract provisions, including convertibility, callability, exchangeability and put provisions (Grundy & Verwijmeren, 2017) and restrictive covenants (Prilmeier, 2017). The covenants could be related to the firm's acquisition, use, and disposition of *assets* or to the restriction of *dividend* payments or a subordination of further debt issues (*financing covenant*) or maintenance of specified financial ratios (*bonding covenants*). Essentially it could be ideal to provide a system of simultaneous equations to control for these joint decisions. However, as Barclays & Smith (1995:619) put it and concurred by Dang (2011), Diamond &He (2014), Matvos, Seru & Silva (2017) and Bruche & Segura (2017), the theory is not rich enough to provide the necessary identifying restrictions for this system.

There are a number of prominent theories of debt maturity choice, but the majority of these theories focus on firm-specific factors and hence do not have clear-cut implications for aggregate time series behavior of firms. Perhaps, the most familiar idea underlying debt maturity choice is the maturity-matching hypothesis wherein liabilities' maturities correlate with assets' maturities. There is doubtless some truth in the maturity-matching hypothesis and indeed, Graham & Harvey's (2001) survey of financial managers rank this maturity-matching factor as the most highly cited factor in debt maturity decision. However, the maturity-matching hypothesis does not provide a rigorous and comprehensive explanation for many empirical patterns of firm behavior in terms of debt maturity.

There are different approaches to the maturity structure problem. A popular approach is based on agency or contracting costs of Jensen & Meckling (1976), Myers (1977) and Barnea, Haugen & Senbet (1980). Myers (1977) and Barnea, Haugen & Senbet (1980) argue that if shareholders' claim on the assets of a levered firm is similar to a call option, then shareholders have an incentive to undertake riskier investments because their call option value is greater when the firm's assets have higher variance. If the firm with long-term risky debt outstanding undertakes positive net present value (NPV) projects, shareholders will not be able to capture the full benefits because part of the firm value goes to debtholders in the form of a reduction in the probability of default (Glover, 2016; Brogaard, Li & Xia, 2017). Short-term debt may alleviate the problem because debt may be due before the firm chooses to invest. Hence, the *contracting-costs theory* suggests that firms with many investment opportunities (or growth options) may prefer to use short-term debt (or callable debt). In his presidential address to the American Finance Association, Diamond (2004) began with the question: How should borrowers and lenders structure financial contracts when contract enforcement

is ineffective and costly? If contractual remedies do not benefit creditors, then they may choose to forgo contract enforcement, a problem known as lender passivity. Diamond (2004) argues that short-term debt can be an effective solution to the problem. However, Diamond's (2004) rigorous analysis is merely theoretical as the author did not conduct empirical tests on his propositions in his paper.

An alternative approach to the maturity question is provided by *tax-based explanation* in conjunction with the term structure of interest rates (Jiang & Zhu (2017), Joslin & Konchitchki (2017), Mian & Santos (2017), Donaldson & Micheler (2017) and Spada (2017)). Suppose the slope of the term structure is positive rather than flat and there is a gain to leverage in the Miller (1977) sense, then a term maturity is optimal because coupon payments on long-term bonds are currently higher than coupons on short-term bonds and the tax benefits of debt (the gain to leverage) is accelerated. If the gain to leverage is less than zero (that is, negative), then the result is reversed.

Yet another point of view to the maturity structure suggests that short-term debt or variable-rate debt can reduce the risk to shareholders and thereby increase equity value if the covariance between net operating income and expected future interest rates is positive. This cross-hedging argument is based on the assumption that unexpected changes in interest rates are a priced (un-diversifiable) factor in the arbitrage pricing model. It does not rely directly either on bankruptcy costs or on interest tax shields (Copeland, Weston & Shastri, 2005). However, the argument for cross-hedging is only strengthened if it increases debt capacity by reducing distress risk and thereby allowing a greater gain from leverage (Subrahmanyam, Tang & Wang (2017); Han, Subrahmanyam, & Zhou (2017); van Binsbergen & Koijen (2017)).

Other views to the debt maturity structure include *liquidity risk view* in which case debt maturity moves in tandem with the overall leverage ratio (Hugonnier & Morellec, 2017), a *strategic view* in which incumbents in an industry respond to entry threats by increasing debt maturity (Parise, 2017), a *gap-filling view* wherein corporate debt maturity structure acts to complement government debt maturity (Greenwood, Hanson & Stein (2010), Badoer & James (2016)) and a behavioural *market-timing or market conditions view* in which managers use maturity structure decisions to take advantage of the slow correction of pricing errors in the financial markets. For instance, high market-to-book growth firms prefer share issues over new debt or retained earnings. When growth firms issue debt, they favour (more overvalued) long-term debt over short-term debt. Repurchases of overpriced securities are a bad investment for growth firms, but dividends are attractive because, holding total assets fixed, they allow growth firms to issue overvalued securities. For low market-to-book value firms, everything reverses. Retained earnings are the cheapest financing source, followed by slightly underpriced short-term debt,

then by more underpriced long-term debt, with most underpriced outside equity last in line. Repurchases of undervalued shares are attractive for value firms, but dividends have high opportunity cost. Baker & Wurgler (2002) and Baker, Greenwood & Wurgler (2003) are strong proponents of the market-timing story which is also labeled in Fama & French (2012) as the mispricing model.

There is doubtless some truth in each of these views to the maturity structure, but they do not add up to a rigorous, complete and conclusive explanation of corporate debt maturity policy. This study seeks to add a developing country perspective to the debt maturity choice literature. By considering an environment with unique institutional features in tax code, supply-side of finance and one of the biggest economies in Africa, the study enriches the interplay between theory and empirical work on debt maturity choice and thus fills an important gap in the corporate finance literature.

Olokoyo (2012) provides a developing country perspective to the debt maturity structure of 101 Nigerian quoted firms for the period 2003-2007. The study finds that short-term debt maturity exerts significant positive influence on corporate performance based on accounting measures such as Return on Assets (ROA) and Return on Equity (ROE). However, despite the profound, extensive and robust analysis of the relationship between debt maturity and performance, the study neither considered the determinants of debt maturity structure nor how debt maturity contributes to firm value. Similar limitations appear in studies of Adenikinju (2009) and Aregbeyen & Periola (2011).

The purpose of this study is to investigate the determinants of debt maturity structure of selected Nigerian quoted firms for a longer period of 16 years from 1999-2014. The year 1999 is chosen as a start year in order to coincide the study with democratic political regime in Nigeria and thus absolve the effect of significant macroeconomic volatility experienced during prolonged military regime in Nigeria. 2014 is chosen as end-year as an attempt to update the data as much as possible. The study is different from many prior studies for many reasons. First, it examines the issue of maturity structure of debt in a developing country whereas several studies have considered firms from developed countries. To the extent that financial development and institutional factors may play significant role in financing choices, then the theories and empirical findings from industrialized countries should be treated with caution when applied to developing countries. For instance, many scholars have argued that the existence of developed and active financial markets and large financial intermediaries should make it easier for firms to raise long-term capital and vice versa. In other words, an inverse relationship may exist between national financial development and short-term borrowing. Thus, this study attempts to enrich the existing literature by extending the data to a developing country characterized with less sophisticated and less-

diversified financial architecture. Second, this study considers the joint impact of firm-specific characteristics, taxes and macroeconomic factors in the debt maturity choice whereas many previous studies have focused on firm-level variables which failed to provide clear-cut explanation of the variation in debt maturity levels with the attendant low explanatory power of the exogenous variables (that is, low R^2). Third, this study attempts to reconcile the debt maturity behavior along the most common non-mutually exclusive theories of debt maturity choice which have been subject to empirical tests in industrialized economies since the 1990s. The use of current data from an emerging market like Nigeria provides fresh perspectives on the implications of the existing theories for corporate financial policy, public policy and future academic research.

The rest of this paper is organized as follows: Section 1 reviews prior work on corporate debt maturity choice or policy. Section 2 considers the methodology including data description, sample construction and definition of variables including the theoretical expectations regarding the signs and magnitudes of the coefficients of exogenous variables. Section 3 discusses the empirical results of the impact of contractual-cost variables, taxes, signaling or asymmetric information and liquidity risk variables on the maturity structure of corporate debt of Nigerian quoted firms. Section 4 discusses the implications of the results and section 5 summarizes and concludes the paper.

2. 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. 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 or contracting costs and information effects and considering how some of these effects influence the corporate debt maturity choice.

2.1 Institutional Environment

The Tax Code

The tax system in general, and specifically the tax treatment of interest and dividend payments, has been recognized as an important factor influencing capital structure choices since the seminal work of Modigliani & Miller (1963). There are three main categories of tax regimes globally (Fan, Titman & Twite, 2012).

The first is the classical tax system in which dividend payments are taxed at both the corporate and personal levels and interest payments are tax-deductible corporate expenses. This classical tax system exists in Nigeria. It also exists in Brazil, Chile, Hong Kong, India, Indonesia, Israel, Japan, Korea, Malaysia, Netherlands, Pakistan, Peru, Philippines, Singapore, South Africa, Switzerland, United Kingdom (post 2000) and the United States. The second is the dividend relief system, where dividend payments are taxed at a reduced rate at the personal level. A dividend relief tax system exists in Austria, Belgium, Denmark, Greece, Portugal, Sweden, Thailand and Turkey. In Greece and Turkey, dividend payments are not taxed at the personal level, that is, a full dividend relief system exists. The third tax regime is the dividend imputation tax system, where corporations can deduct interest payments but where the domestic shareholders of a corporation receive a tax credit for the taxes paid by the corporation. The goal of the dividend imputation tax system is to tax corporate profits only once. Dividend imputation systems are in place in Australia, Canada, France, Germany, Ireland, Italy, Mexico, New Zealand, Norway, Spain, Taiwan and United Kingdom (pre-2001). The proportion of corporate tax available as a tax credit under these imputation systems varies from country to country. In Australia, Finland, Germany, Italy, New Zealand and Norway, the full amount of the corporate tax paid is distributed as a tax credit. In other countries, only parts of the corporate tax credits are distributed (Fan, Titman & Twite, 2012).

All else equal, it is expected that firms in countries with dividend imputation or tax relief systems will use less debt relative to firms in classical tax regimes that double tax corporate profits. To test for this relationship for each country, studies typically estimate the tax shield, using the tax gain from leverage variable introduced in Miller (1977).

The tax gain from leverage can take both positive and negative values. Negative values arise under a dividend relief tax system, when the personal tax rate on interest income is greater than the corporate tax rate and the personal tax rate on dividend income is less than the corporate tax rate. This is the case under the full dividend relief system as it exists in Greece and Turkey, as well as some partial relief countries like Belgium and Thailand. The tax gain from leverage is zero under a full dividend imputation tax system, which

is the case in Australia, Germany, Italy, New Zealand and Norway. For all other countries, the tax gain from leverage is positive (Fan, Titman & Twite, 2012).

The Supply-Side of Capital.

Finance scholars have typically viewed the capital structure and maturity structure problems from the perspective of firms that face competitive and complete financial markets, where debt and equity capital are offered at equivalent risk-adjusted rates based on assumptions of asset pricing models (Akintola-Bello, 2004) such as the capital asset pricing model (CAPM) of Sharpe (1964), Lintner (1965) and Black (1972). However, when this is not the case, the preferences of investors to hold debt versus long-term debt will have an influence on how firms are financed. For example, in the Miller (1977) model, the aggregate debt ratio in the economy is determined by aggregate investor preferences for holding debt versus equity securities. While these preferences are determined by taxes in the Miller model, one can more generally consider how investor preferences for holding different debt maturities affect the maturity structure choice of firms.

For instance, the preferences of banks, pension funds, insurance companies and mutual funds can tilt the maturity structure of corporate liabilities towards either short-term debt or long-term debt. Banks tend to have short-term liabilities and thus may have a comparative advantage holding short-term debt. In contrast, insurance companies, pension funds and mutual have long-term liabilities, and thus have a preference for holding long term assets. Hence, all things being equal, it is expected that firms in countries with a larger banking sector will use more short-term financing while firms in countries with larger pension funds, mutual and insurance companies to use more long-term financing.

In addition, the size of government domestic debt can influence the supply of funds to the corporate sector and the maturity of such funds (Greenwood, Hansen & Stein, 2010; 2015; Badoer & James, 2016; Bruche & Segura, 2017; Spada, 2017). Government borrowing can influence the supply of corporate debt or the maturity of debt for two reasons. The first is a simple crowding out argument (Greenwood, Hansen & Stein, 2015; Mankiw, 2016; Blanchard, 2017). If there is a fixed supply of debt capital, then the government debt can compete for that fixed supply and leave less available for corporate borrowers. The second possibility is that the supply is not fixed, and that the presence of government borrowing stimulates the debt market, thereby increasing the demand for corporate debt.

Taken together, the tax code and supply-side factors underscore the importance of the institutional environment in the investigation of debt maturity structure determinants in Nigeria.

2.2 The Foundations – Tax Explanation of Debt and Debt Maturity Policy.

Modigliani & Miller (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 & Miller.

With the perspective provided by asset pricing models of Sharpe (1964), Lintner (1965) and Black (1972), which were unavailable to MM, it became clear that their propositions do not require their "risk classes" assumption. Fama (1978) provides a capstone. Fama (1978) argues that the MM propositions hold in any asset pricing model that shares the basic MM assumptions (perfect capital market, including no taxes, no transaction costs, and no information asymmetries or agency problems), as long as (i) investors and firms have equal access to the capital market (so investors can undo the financing decisions of firms), or (ii) there are perfect substitutes for the securities issued by any firm (with perfect substitute defined by whatever happens to be the right asset pricing model). 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:

$$V_L = V_u + \frac{(1-\tau_c)(1-\tau_{pe})}{(1-\tau_{pD})} D \qquad (1)$$

Where V_u represents value of an unlevered firm of equivalent risk, τ_c represents corporate tax, τ_{pe} represents the personal tax rate on equity income, τ_{PD} represents the personal tax rate on bond income and D represents the market value of debt.

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:

$$(1-\tau_{PD}) = (1-\tau_c)\,(1-\tau_{pe}) \quad (2)$$

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

$$G = \frac{1-(1-\tau_c)}{(1-\tau_{pD})}D \quad (3)$$

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. Interesting theoretical analysis and empirical evidence on the impact of taxes on financing decisions are also provided in Doidge & Dyck (2015) and Scholes, et al (2015).

2.3. Debt Maturity Theories and Variables.

The theoretical literature provides a number of non-mutually exclusive theories about the determinants of debt maturity. These are agency or contracting-cost theories or hypotheses, tax hypotheses, signaling hypotheses, liquidity risk and maturity-matching hypotheses.

***Agency or Contracting-Cost Hypotheses*:**
Growth Opportunities: Myers (1977) argues that a firm's future investment projects are like growth options. Accordingly, the value of a firm depends on whether the firm's managers optimally exercise these options. If the firm is a pure-equity stream, that is wholly equity-financed, managers (acting on behalf of shareholders) optimally exercise all profitable growth options. With debt in the firm's capital structure, however, managers may fail to exercise some of the profitable options if creditors stand to capture a large enough fraction of the expected earnings. Myers (1977) shows that this underinvestment problem can be solved by issuing debt that matures before the growth options are to be exercised. Therefore, a firm's debt maturity should decrease with its growth options. Growth is measured by the ratio of market value of the firm to its book value.

Firm Size: Empirical studies suggest that the ratio of bankruptcy costs to firm value tends to decrease as firm size increases. In addition, some studies suggest that small firms tend to be financed by short-term debt because they may face high transaction costs when they issue long-term debt or equity (scale diseconomies). Some scholars also suggest that bondholder-shareholder agency conflicts tend to be greater in severity in smaller firms relative to large firms. In certain scenarios, the relationship is mixed (Garlappi, Giammarino & Lazrak, 2017). However, it is a commonly accepted idea that shortening the debt maturity can ameliorate these problems. Firm size is typically measured by the natural logarithm of total sales or revenue.

***Tax Hypotheses*.**

Tax Rates: Suppose there is a multi-period model in which the choice of debt maturity involves a trade-off between the per-period tax advantage of debt and the costs of debt issuance and possible bankruptcy. Thee model implies that the firm lengthens debt maturity as the tax advantage of debt decreases to ensure that the remaining tax advantage of debt is not less than expected flotation and bankruptcy costs. Thus, a firm's debt maturity should decrease with its effective tax rate (Orman & Koksal, 2016).

Term structure of interest rates: In a multi-period tax-based framework of Brick & Ravid quoted in many textbooks (Berk & DeMarzo, 2014; Copeland, Weston & Shastri, 2005) and empirical research (Orman & Koksal, 2016), a firm optimally chooses long-term debt when there is a tax advantage to borrowing in the Miller (1977) sense and the term structure of interest rates is upward sloping. This is because an increasing term structure accelerates the tax advantage into the early periods of the debt obligation, thereby increasing the total tax advantage in present value terms. Hence, a firm's debt maturity should increase with the slope of the term structure of interest rates. In this study, term structure or spread is measured as the difference between the return on treasury bill and return on government long-term bonds in line with empirical studies (Golinski & Spencer, 2017).

Volatility of interest rates: Utilizing insights from option pricing theory of Black & Scholes (1973) and Merton (1973), a multi-period model of Kim, Mauer & Stohs (1995) is a frequent reference point to analyze how corporate debt maturity affects investors' tax-timing options to tax-trade corporate securities. They show that a more volatile interest rate process produces more volatile bond prices, which in turn leads to a larger tax-timing option value. Since the value of the tax-timing option, like standard options, increases with maturity, it becomes optimal for the firm to issue long-term debt when the

interest rate volatility is high (Blanco & Wehrheim, 2017; Joslin & Konchitchki, 2017). Thus, a firm's debt maturity should increase with the volatility of interest rates.

Volatility of firm value: Also utilizing insights from option pricing, the famous Kane-Marcus-McDonald (1985) multi-period model concerns the impact of firm value volatility on debt maturity. It was argued that the maturity of debt increases when the volatility of firm value decreases as the firm does not have to rebalance its capital structure as often to moderate expected bankruptcy costs. Hence, a firm's debt maturity should decrease with the volatility of firm value.

***Signaling Hypotheses*.**

Separating Equilibrium: Flannery (1986) argues that if the market cannot distinguish between good firms and bad firms, good firms may choose to issue short-term debt to signal their quality. This happens if long-term debt faces higher credit deterioration than short-term debt, and only good firms can afford the positive transaction costs of rollover of short-term debt.

In this study, firm quality is measured by the ratio of risky intangible assets to total assets. The lower the ratio, the better quality a firm is. Short-term debt maturity and firm quality are expected to be positively related.

Credit Ratings: Credit rating serves as another reference point in an asymmetric information market framework (Kedia, Rajgopal & Zhou, 2017; Jiang & Zhu, 2017). Firms that are rated are more likely to use long-term debt than their unrated counterparts provided their long-term debt are not significantly undervalued. In other words, short-term debt usage is a declining function of ratings. A dummy variable, of one if firm debt is rated and zero otherwise, is utilized in this study to capture the impact of ratings on debt maturity choice.

Stock Price Reaction: One of the empirical implications of the asymmetric information model of Flannery (1986) is the stock price reaction to changes in firm's average debt maturity. According to Flannery (1986), a firm's equity market value should rise if it shortens its outstanding debt's average maturity. This study relates the market-to-book value of equity to the maturity structure.

***Liquidity Risk Hypotheses*.**

Diamond (1991) indicates the optimal debt maturity is attained by a trade-off between the benefit of short-term debt and liquidity risk. He argues that if control rents are very high, borrowers may issue long-term debt to avoid high liquidation costs. Short-term debt is used to address the information

sensitivity. In addition, he proposes that there is a non-monotonic relationship between debt maturity and the borrower's credit rating. Firms with high and low credit ratings choose short-term debt, and firms with medium credit rating tend to choose long-term debt.

A positive relationship between debt maturity and leverage is also consistent with a liquidity risk hypothesis (Mian & Santos, 2017). In this study, liquidity is measured by the quick or acid-test ratio which is given as the ratio of current assets less inventories to current liabilities.

***Maturity-Matching Principle*.**

Myers (1977) argues that the diversification of assets may increase the amount of debt the firm can borrow. Furthermore, he indicates that assets may be regarded as the protection for the repayment of debt. In order to match assets with debt, he suggests that the exposure of debt should be reduced in parallel with the decline in the value of assets.

Graham & Harvey's (2001) survey in which the authors asked 392 CFOs how firms choose between short-term debt and long-term debt indicates the maturity-matching principle as the most popular rationale.

2.4. Empirical Review

Here, an attempt is made to document empirical review of capital structure research and the corresponding degree of explained variation (R^2). Several authors have conducted empirical tests of the theories of debt maturity that I cannot claim completeness here. Thus, effort is made to summarize the main findings in tabular form.

Table 1: Review of Empirical Debt Maturity Structure Research (Selected Papers)

S/N	PAPER	LOCATION OF STUDY	METHODOLOGY	MAIN RESULTS	Adj. R^2 (*Leverage regressions on conventional factors*)
1	Barclays & Smith (1995)	United States	Used a sample of manufacturing firms with SIC codes from 2000 to 5999 for the period 1974-1992 (39,949 firm-year observations) and conducted simple correlation analysis and OLS regression (pool, cross-section and FE). Debt maturity is measured as ratio of long-term debt to total debt.	Consistent with the contracting cost hypothesis, the coefficient of the proxy for investment opportunity (i.e., the market-to-book ratio) is negative and highly significant in all three regressions. In other words, firms with more growth options have significantly less long-term debt and vice versa. It is also consistent with the hypothesis that firms with larger potential information asymmetries issue less long-term debt. Regulation increases the proportion of long-term debt and so does size. The term	Pooled - 16% Cross- 26%, FE – 61%.

				structure variable exerts a downward pressure on the use of long-term debt. Several aspects of these results were buttressed in Barclays, Morellec & Smith (2006)	
2	Greenwood, Hanson & Stein (2010)	United States	For government debt, the authors utilized the bond database from CRSP. For corporate debt, they relied on two sources viz: Federal Flow of Funds database and Compustat with the period of study being 1963-2005. The estimation procedures include OLS regressions, Instrumental Variable (IV) regressions and Generalized Least Squares (GLS)	The authors document results consistent with the market timing theory to debt maturity choice through a model of firms acting as macro-liquidity providers who absorb the balance or gap left by government debt maturity choice. They argue that debt market timing by firms makes more sense when viewed through the lens of liquidity provision. Specifically, they find that when government finances itself with more short-term debt, firms fill the resulting gap by issuing	**OLS**: Base -73% 1st half - 58% 2nd half- 95% Long Sample- 70% Business Cycles leads and lags – 74% Swaps adj - 73% **IV**: Base – 73% Credit spreads – 75% **GLS**: FOF levels – 73% FOF issues- 59%

				more long-term debt, and vice versa.	
3	Abor (2008)	Ghana	Sample consists of publicly quoted firms, large unquoted firms and small and medium enterprises (SMEs) in Ghana. Panel data Regression (OLS) models were utilized.	The results show that quoted and 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.	SMEs -LTDR (54%) -STDR (81%) Unquoted -LTDR (58%) -STDR (85%) Quoted -LTDR (67%) -STDR (91%)
4	Dang (2011)	United Kingdom	Panel data least squares techniques of UK firms for the period 1996-2003.	High growth firms control underinvestment incentives by reducing leverage and debt maturity as predicted by the liquidity risk hypothesis. Leverage has a negative impact	Undisclosed

				on firm investment levels which is consistent with the (agency costs of) overinvestment hypothesis regarding the disciplinary role of debt for matured firms.	
5	Orman & Koksal (2016)	Turkey	Used a sample of both publicly-traded and privately-held firms across a variety of industries in Turkey for the period 2004-2013.	The authors defined debt maturity structure (dependent variable) as the ratio of long-term debt (i.e., debt tenor above one year) to total debt. Nonfinancial debt is excluded in measurement. The factors that influence debt maturity choice are leverage, size, asset maturity, inflation, interest volatility and earnings volatility.	Undisclosed
6	Cai, Fairchild & Guney (2008)	China	Utilized a panel of Chinese publicly traded firms for the period 1999-2004.	The study finds that the size of the firm, asset maturity and liquidity have significant effects in extending the debt maturity of Chinese	Pooled - 33% FE – 61% Random - 19% GMM- 26%

				companies. Collateral and growth options also play a role in the debt maturity choice. However, the proxies for firm quality and effective tax rate apparently report mixed or unexpected results.	
7	Kirch & Terra (2014)	Five South American Countries viz: Argentina, Brazil, Chile, Peru & Venezuela	Secondary data were utilized for a final sample of 359 firms over a 12-year period 1996-2007 (2,734 observations). Dynamic panel data analytical techniques were utilized	There is substantial dynamic component in debt maturity structure; Firms face moderate adjustment frictions with debt maturity; Size, business risk and tangibility have positive and significant effects on debt maturity; Taxes and low ratings have negative impact on debt maturity; Financial development have no impact while the quality of institutions have significant positive impact.	Undisclosed

8	Fan, Twite & Titman (2012)	Publicly traded firms in 39 developing and developed countries	Secondary data were obtained from Worldscope for the period 1991-2006. Panel data least squares techniques were engaged in the debt maturity estimation on both firm-level &country-level factors.	Long term debt is used more by firms with greater asset tangibility (38 out-of-39 countries), larger size (33/39) and higher profits (25/39). In contrast to findings on the US, market-to-book ratio is only weakly associated with debt maturity in the full sample (28/39 but insignificant in most) and is unrelated to debt maturity in the developed economy subsample.	Full sample-22%, Developing – 23%, Developed – 20%, Select OECD sample – 24%.
9	Gathogo & Ragui (2014)	Kenya	Sample firms include public quoted firms, large unquoted firms and SMEs as in the Abor (2008) study. Panel Data Regression techniques were utilized here.	Firm-specific factors exert the following influences on capital structure viz: size (+ve), age (+ve), profitability (-ve), liquidity (-ve), cost of debt (-ve), business risk (-ve) and industry type (-ve).	36%.

Source: Author (2016)

3. 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), I focus exclusively on non-financial corporations. Second, I could not collect the necessary data for many of the smaller firms on the NSE. 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. Sample period commencement at 1999 allows us to understand the recent situation about firms' debt maturity structure in Nigeria rather than performing a historical analysis. In addition, the choice of 1999 as start year allows a focus on the period after the long years of unbroken military rule in the country during which dictatorship and questionable economic reforms reigned in the country. This choice helps to rule out the heightened macroeconomic volatility and era of galloping inflation. 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.

Table 2: Distribution of the Sample of the Study

S/N	SECTOR	POPULATION	SAMPLE	SAMPLING 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)*.

Model Specification

Debt maturity is expressed as a function of both firm-specific characteristics, supply-side and macroeconomic factors.

Following empirical approaches therefore, the ratio of short-term debt to total debt (DMS) is employed as a dependent variable in this study. The DMS is regressed against firm-specific characteristics, supply-side and macroeconomic variables. such as age, size, profitability, growth, and tangibility of assets, volatility of earnings, asset uniqueness and a macroeconomic factor (expected inflation).

The implicit model can be expressed thus:

$$DMS_{it} = f FS_{it}, SS_{it}, MAC_{t}) \quad (4)$$

Where FSit = Firm specific factors for Firm i at time t

SSt = Supply-side factors at time t
MACt = Macroeconomic factors at time t

From the foregoing specifications of factors for the theoretical hypotheses and models, it is important to make further comments in the interest of parsimony. It might be desirable to remove inessential factors. There are many methods that can be used to decide which factors to retain and which to drop. The Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC) are the two most commonly used model selection criteria {Frank and Goyal (2009)}. Let P be the number of parameters and let N be the number of observations in a fitted model. The BIC is defined as follows:

$$BIC = -2 \text{ X } \log \textit{likelihood} + P \text{ X } \log (N) \quad (5)$$

The Akaike Information Criterion (AIC) is measured similarly, but with the number 2 replacing log(N) in the definition. Both BIC and AIC have a sensible structure. In each case, smaller is better. As the log-likelihood increases, both measures fall. As the number of parameters increases, both measures increase. As the number of observations increases, so does the BIC. BIC is asymptotically consistent. In other words, suppose that we have a family of possible models that includes the true model. Then as the sample size grows to infinity, the probability that the BIC will pick the true model approaches one. In small samples, it is not clear whether AIC or BIC is better. Since log (N)>2, the BIC tends to select a more parsimonious model.

The firm-specific characteristics, supply-side and macroeconomic variables employed in this study can be seen in Equation (6).

$$\begin{aligned} DMS_{it} = \; & f(MTR_{it}, TANG_{it}, GROW_{it}, SIZE_{it}, VOL_{it}, PROF_{it}, QUICK_{it}, \\ & RD_{it}, UNQ_{it}, DEF_{it}, DIV_{it}, EINF_{t}, AGE_{it}, RAT_{it}, UER_{t}, CPS_{t}, \\ & EMC_{t}, MPR_{t}, TS_{t}, ASI_{t}, GB_{t}, GDPG_{t}) \end{aligned} \quad (6)$$

All the variables are defined in Table 3. 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. The regression parameters (β's) are stated in column five of Table 3.

However, some of the variables require some explanations. *NDTS* represents non-debt tax shield inspired by DeAngelo & Masulis (1980). This factor has limited theoretical implication for the choice of debt maturity.

Table 3: Short-term Debt Maturity Structure Determinants, 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.	Effect of debt tax shield	+	$0 < \beta_{MTR} < 1$
2	TANG	Tangible assets defined as PPE divided by total assets less current liabilities.	Collateral, a measure of debt capacity.	-	$-1 < \beta_{TANG} < 0$
3	GROWTH	Growth opportunities, measured by the ratio of market-to-book value of the firm or market to book value of equity.	Growth	+	$0 < \beta_{GROW} < 1$
4	SIZE	Size defined as the natural logarithm of Sales (LNS)	Size effect	-	$-1 < \beta_{SIZE} < 0$
5	VOL	Volatility of earnings defined as the standard deviation of EBIT scaled by Total Assets less current liabilities	Business Risk	-	$-1 < \beta_{VOL} < 0$
6	PROF	Defined by ROCE or ROA = Earnings before Interest and Taxes/ Total Assets less current liabilities	Profitability	+	$0 < \beta_{PROF} < 1$
7	QUICK	A stricter measure of liquidity relative to current ratio. Quick ratio is	Liquidity	+	$0 < \beta_{QUICK} < 1$

		defined as Current assets less inventory divided by current liabilities			
8	RD	Research & Development plus other intangible assets / (Total Assets – Current Liabilities)	Asset Uniqueness or intangibility	-	$-1 < \beta_{RD} < 0$
9	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	-	$0 < \beta_{DEF} \leq 1$
10	DIV	Dividend payout ratio defined as Dividends divided by Profit after tax (PAT) or Dividend per share (DPS) divided by Earnings per share (EPS).	Asymmetric information. High payout firms will prefer short-term debt over long-term financing.	+	$-1 < \beta_{DIV} < 0$
11	EINF	Expected inflation proxied by the treasury bill rate	Impact of macroeconomic conditions on financing.	+	$0 < \beta_{INF} < 1$
12	AGE	Ln (Number of years since incorporation).	Impact of the firm's age on debt maturity choice. AGE may be correlated with SIZE.	+	$0 < \beta_{AGE} < 1$
13	UNQ	Uniqueness dummy (for distress risk) that takes the	Asset uniqueness/ Industry uniqueness. +	-	$0 < \beta_{UNQ} < 1$

		value of one for firms producing computers, semiconductors, chemicals and allied, aircraft, space vehicles and other sensitive industries, and zero otherwise.			
14	RAT	Rating dummy for debt market access that takes the value of one if firm debt is rated, and zero otherwise	Debt market access/ Long-term borrowing capacity	-	$-1 < \beta_{RAT} < 0$
15	TS	Term spread measured as the difference between returns on Treasury Bond and Treasury Bills. Higher term spread indicates higher term premium required by investors. The greater the term spread the greater the corporate incentive to borrow long in order to accelerate tax benefits of debt when the yield curve is positive.	Debt market conditions.	-	$-1 < \beta_{TS} < 0$
16	CPS	Private credit to GDP ratio.	A measure of expansionary credit or otherwise in the economy	+ /- depending on maturity	$-1 < \beta_{CPS} < 1$
17	GB	Measured as government borrowing to	Government borrowing impact on corporate borrowing.	- /+$-1 < \beta_{GB}$ <1	

		GDP ratio as in Graham, Leary and Roberts (2014b).	GB may crowd out corporate borrowing (Badoer & James, 2016) OR stimulate it if an open economy is public-sector driven		
18	UER	Unemployment rate. Unemployment risk is a substantial concern for workers. Workers' concerns about becoming 9unemployed reduce their labour supply and affect firms' policies on layoffs and wage setting	A control variable: Unemployment Risk, measuring impact of employees' exposure to unemployment on capital structure.	-	$-1 < \beta_{UER} < 0$
19	GDPG	GDP growth rate	General macroeconomic conditions	-/+	$-1 < \beta_{GDPG} < 1$

Source: Author (2016)

SIZE represented by the natural log of sales. *TANG* represents the tangibility of the firm's assets, a collateral measure of debt capacity. *GROW* 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, a measure of business risk. *PROF* represents profitability, measured by the Return on Assets (ROA). *RD* 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 (2009) and utilized in many empirical studies 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. $EINF_t$ represents expected inflation, a macroeconomic factor.

Definition of Variables

The explanatory or exogenous variables utilized in this study are defined in Table 3.

Estimation Procedures

Panel data regression techniques are utilized for the study for the 50 selected companies over the period, 1999-2014.

The **null hypothesis** is that the β's (regression parameters) 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, supply-side and macroeconomic variables do not exert significant impact on corporate debt maturity ratios. The influence of less important (explanatory) factors is taken into account by the introduction of a random variable, usually denoted by "ε" or "u".

4. EMPIRICAL RESULTS

This section presents the empirical analysis and results of the study. Again, the research aim is to investigate the determinants of short-term debt maturity choice as a vital ingredient of the capital structure behaviour of Nigerian quoted firms. Beginning from the summary statistics in Table 4, the nature of the variables are described. The regression results are presented in Tables 5 and 6.

4.1 Summary Statistics of the Variables of the Study

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 debt maturity structure statistics reveal the predominance of the use of short-term sources of funds over long-term sources in the financing of capital and recurrent expenditures of Nigerian quoted firms. The actual firm-level observations reveal instances where only short-term borrowings existed on the liabilities side of the balance sheets of some firms for certain years. The skewness of the short-term debt maturity ratio is negative implying that the tail on the left side of the probability density function is longer or fatter than the right side.

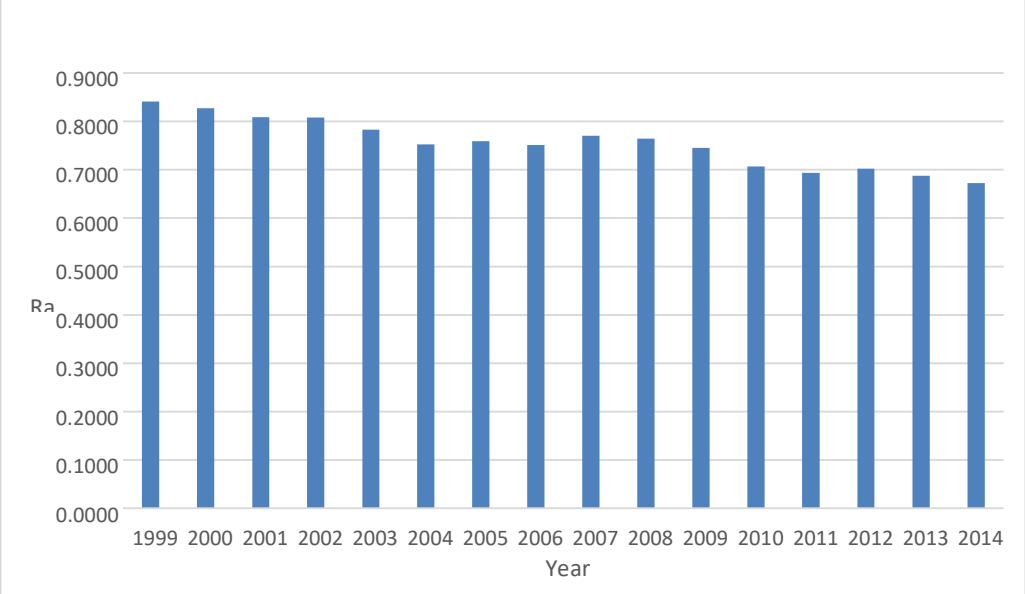
Table 4: Summary Statistics of Variables used in the Study

VAR	Mean	Median	Max.	Min.	Std. Dev.	Skew	Kurtosis	Jarque-Bera
DMS	0.755	0.809	1.000	0.000	0.212	-1.362	4.90	18329
BLT	0.687	0.605	9.263	-0.340	0.560	8.159	100.46	16255616
MTR	0.286	0.302	13.333	-16.346	1.065	2.058	153.92	37944563
TANG	0.624	0.635	3.097	-4.548	0.543	-2.834	30.96	1355217
GROW	1.631	1.776	96.429	-	40.209	-	681.22	770000000
SIZE	15.232	15.442	20.293	0.000	2.972	-2.569	13.60	231119
VOL	0.504	0.106	16.441	-2.245	2.129	6.317	42.23	2826856
PROF	0.213	0.215	4.706	-8.324	0.676	-4.257	60.14	5556220
QUICK	0.693	0.628	2.995	0.000	0.418	1.756	7.85	59735
RD	0.023	0.000	0.893	0.000	0.097	6.368	47.35	3544312
UNQ	0.620	1.000	1.000	0.000	0.486	-0.492	1.24	6756
DEF	0.210	0.133	14.235	-4.317	0.806	7.496	132.76	28402908
DIV	0.415	0.372	7.083	0.000	0.475	4.529	55.21	4674762
EINF	0.112	0.118	0.189	0.040	0.040	0.068	2.21	1075
AGE	3.715	3.761	4.511	0.337	0.404	-1.826	11.37	138788
RAT	0.178	0.000	1.000	0.000	0.382	1.686	3.84	20112
UER	0.168	0.148	0.239	0.082	0.051	0.220	1.67	3281
CPS	0.160	0.169	0.369	0.009	0.082	0.762	3.83	5020
MPR	0.124	0.123	0.190	0.061	0.035	0.089	2.39	680
TS	0.896	0.902	0.977	0.821	0.043	0.065	2.12	1309
GB	0.376	0.331	0.741	0.197	0.144	1.200	3.62	10241
GDPG	0.075	0.067	0.213	0.004	0.042	1.928	7.85	63937

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. The macroeconomic factors can be ranked in this order according to their mean values viz: Term spread, government borrowing, unemployment rate, credit to private sector, monetary policy rate and economic growth. The debt maturity structure is negatively skewed implying that the tail on the left side of the probability density function is longer or fatter than the right side.

Figure 1: Debt Maturity Structure of Sample Firms (1999-2014)



4.2 The Determinants of Debt Maturity Structure of Quoted Firms in Nigeria

Here, an attempt is made to relate the maturity structure of corporate liabilities to the conventional leverage factors in order to ascertain the explanatory power of these factors. The proxy used for debt maturity is the maturity structure of the entire corporate liabilities. Both financial and non-financial liabilities are included.

Regression Results of the determinants of Debt Maturity structure are presented in two Tables - Tables 5 and 6. Table 5 - Debt Maturity Regression I shows the results exclusive of tax shield, tangibility, dividend payout and

growth variables. Table 6 – Debt Maturity Regression II shows the results inclusive of tax shield, tangibility, dividend payout and growth variables.

Table 5: Debt Maturity Regression I

Dependent Variable: DMS
Method: Pooled EGLS (Period weights)
Sample (adjusted): 3 800; Included observations: 797 after adjustments
Cross-sections included: 50; Total pool (balanced) observations: 39850
Debt Maturity Regression I

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.5188	0.0114	45.3198	0.0000*
DMS(-1)	0.6158	0.0009	650.2118	0.0000*
DMS(-2)	0.0869	0.0009	91.6657	0.0000*
SIZE	-0.0030	0.0001	-49.9906	0.0643***
VOL	-0.0026	0.0001	-22.2433	0.0450**
PROF	0.0123	0.0002	61.5946	0.0320**
QUICK	-0.0116	0.0001	-88.0200	0.0103**
RD	-0.0654	0.0012	-55.4873	0.1100
UNQ	0.0005	0.0002	2.5011	0.1524
DEF	-0.0127	0.0002	-58.3131	0.0420**
EINF	0.9561	0.0163	58.8360	0.0000*
AGE	0.0591	0.0002	380.9837	0.0000*
RAT	-0.0206	0.0002	-109.9782	0.0000*
UER	-0.2471	0.0047	-52.2443	0.0000*
CPS	-0.3283	0.0073	-44.6680	0.0000*
EMC	-0.5095	0.0089	-57.2378	0.0000*
MPR	0.3280	0.0068	47.9154	0.0000*
TS	-0.5989	0.0159	-37.7631	0.0000*
ASI	0.0056	0.0003	19.6341	0.0000*
GB	0.4788	0.0085	56.5957	0.0000*
GDPG	-0.7804	0.0064	-122.8449	0.0000*

	Weighted	**Statistics**	
R-squared	0.9999	Mean dependent var	10.43937
Adjusted R-squared	0.9999	S.D. dependent var	97.53046
S.E. of regression	0.1201	Sum squared resid	574.2550
F-statistic	13593510.000	Durbin-Watson stat	1.638722
Prob(F-statistic)	0.0000		
	Unweighted	**Statistics**	
R-squared	0.663480	Mean dependent var	0.754487
Sum squared resid	604.1490	Durbin-Watson stat	2.031747

*Significance at 1%, **Significance at 5% and ***Significance at 10%

Table 6: Debt Maturity Regression II

Dependent Variable: DMS
Method: Pooled EGLS (Period weights)
Sample (adjusted): 3 800
Included observations: 797 after adjustments
Cross-sections included: 50
Total pool (balanced) observations: 39850
Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.5188	0.0114	45.3198	0.0000*
DMS (-1)	0.6158	0.0009	650.2118	0.0000*
DMS (-2)	0.0869	0.0009	91.6657	0.0000*
MTR	0.0056	0.0002	28.9619	0.0000*
NDTS	0.2114	0.0007	322.1200	0.0000*
TANG	-0.0236	0.0002	-137.7899	0.0000*
GROW	0.0000	0.0000	3.0323	0.0024*
SIZE	-0.0030	0.0001	-49.9906	0.0000*
VOL	-0.0026	0.0001	-22.2433	0.0000*
PROF	0.0123	0.0002	61.5946	0.0000*
QUICK	-0.0116	0.0001	-88.0200	0.0000*
RD	-0.0654	0.0012	-55.4873	0.0000*
UNQ	0.0005	0.0002	2.5011	0.0124
DEF	-0.0127	0.0002	-58.3131	0.0000*
DIV	0.0077	0.0001	69.0184	0.0000*
EINF	0.9561	0.0163	58.8360	0.0000*
AGE	0.0591	0.0002	380.9837	0.0000*
RAT	-0.0206	0.0002	-109.9782	0.0000*
UER	-0.2471	0.0047	-52.2443	0.0000*
CPS	-0.3283	0.0073	-44.6680	0.0000*
EMC	-0.5095	0.0089	-57.2378	0.0000*
MPR	0.3280	0.0068	47.9154	0.0000*
TS	-0.5989	0.0159	-37.7631	0.0000*
ASI	0.0056	0.0003	19.6341	0.0000*
GB	0.4788	0.0085	56.5957	0.0000*
GDPG	-0.7804	0.0064	-122.8449	0.0000*

Weighted Statistics			
R-squared	0.9999	Mean dependent var	10.4394
Adjusted R-squared	0.9999	S.D. dependent var	97.5305
S.E. of regression	0.1201	Sum squared resid	574.2550
F-statistic	13593510.0000	Durbin-Watson stat	1.6387
Prob(F-statistic)	0.0000		

Unweighted Statistics			
R-squared	0.6635	Mean dependent var	0.7545
Sum squared resid	604.1490	Durbin-Watson stat	2.0317

* Significant at the 1% level

4.3. Discussions and Implications of the Empirical results

The results as shown in Table 5 shows that firm-specific characteristics, supply-side and macroeconomic variables are all significant at the 5% level with the exception of UNQ (Asset Uniqueness), RD (Research and Development) and SIZE. Table 5 shows that SIZE is significant at the 10% level. However, when tax shield, tangibility, dividend payout and growth variables are added to the specification, Table 6 shows that all the firm-specific characteristics, supply-side and macroeconomic variables are significant at the 5% level. The lagged variables in both Tables 5 and 6 introduced to correct for autocorrelations are significant at the 5% level showing the correctness of the specifications. Regression statistics are all reasonable in Table 5 and 6 showing that the models are well specified.

Thus, the results presented in this study confirm the relevance of both firm-specific factors and external (macroeconomic) factors in the evolution of debt maturity structures of Nigerian quoted firms. As a matter of relative significance, the external factors exert greater impact on the short-term debt maturity choice relative to the influence of firm-specific factors.

Contracting Costs Factors.

First, there is substantial dynamic component in the debt maturity structure of Nigerian quoted firms. This fact is revealed by the significant coefficients of the lagged values of debt maturity which are quite robust to alternative regression estimations of the determinants of debt maturity. Thus, history plays a significant role in the debt maturity mix. Perhaps, this could be due to significant adjustment costs that firms may face should they decide to alter their debt maturity mix in a significant manner as opposed to minor adjustment.

Second, growth opportunities, proxied by the market-to-book value, exerts a positive and significant impact on the use of short-term borrowing. This relation has several implications. It could imply that short-term debt has an impact in ameliorating the agency cost of under-investment analyzed in Myers (1977) and Jensen & Meckling (1976). If firms have abundant growth options but do not have corresponding long-term financial muscle to undertake them perhaps because they are highly levered and have reached the limits of debt capacity, then the firms may be forced to bypass such investments which could be costly for the shareholders given efficient capital markets. The use of short-term borrowing would attenuate such financing concerns.

Another agency or contracting-cost concern that explains the positive relation between growth options and debt maturity is the possibility that managers, acting on behalf of shareholders, choose to borrow short so that returns from new investments can be captured more fully by shareholders,

rather than committing to pay long-term profits as interests to debtholders. In addition, it could also imply that interest rates favour the use of short-term debt relative to long-term or firms could prefer to borrow short-term while waiting for long-term rates to decline. Finally, borrowing short-term could be a credible strategy to reduce the possibility or chance that firms would want to take on risky projects. In other words, short-term debt has the potential to reduce the agency cost of over-investment as in the free-cash flow theory of Jensen (1986), Stulz (1990), Hart & Moore (1995) and related analysis of Diamond (2004), Hennessy & Whited (2007), Diamond & He (2014).

Third, there is an inverse and significant relationship between size and short-term debt maturity as predicted by theory. In other words, small firms utilize more short-term borrowing than large firms as debt maturity is a declining function of size. Several reasons account for this relation. First, issuance costs for large public issues have significant fixed component resulting in significant scale economies. Smaller firms are less able to exploit these scale economies and thus, they typically opt for private debt with its lower fixed costs and consequently lower overall average costs. Similarly, small firms that choose bank debt over public debt because of lower flotation costs will have more short-term debt.

Signaling Hypotheses.

The debt maturity regression results also confirm the predictions of the signaling hypotheses along the lines of *firm quality* and *credit risk rating*.
First, using the ratio of intangible assets such as goodwill and research and development expenditure as proxy for firm quality - wherein low-quality firms have higher proportions of their assets represented by risky and intangible assets that may be difficult to realize in case of liquidation – this study finds a significant and inverse relationship between debt maturity choice and firm quality. In other words, in equilibrium, firms with abundant risky and intangible assets exercise greater caution in the use of short-term borrowing while high-quality firms with less risky intangible assets issue short-term debt.

Next, firms that are rated are more likely to use long-term debt than their unrated counterparts provided their long-term debt are not significantly undervalued. In other words, short-term debt usage is a declining function of ratings. From the results, rated firms are more likely to reduce short-term debt usage by two percent relative to their unrated counterparts. The seeming minute rating coefficient is significant and robust across alternative regression estimations. The seeming minute rating coefficient may however be rationalized by liquidity risk concerns which affect both rated and unrated firms alike. The RATING relation holds that firms with perceived credit worthiness can issue debt securities in the capital market which those firms with low or no ratings cannot mimic. For instance, only companies with

impressive investment grade ratings can successfully issue unsecured securities such as commercial papers (CP) which are basically short-term money market instruments. Other investment-grade rated firms can access loans from banks without pledging collateral. Taking together, a rating dummy is a significant variable in the choice of debt maturity choice. To access the CP market in Nigeria, for instance, firms must possess pre-defined criteria in order to protect investors against abuses of the past especially late 20th century wherein firms with questionable ratings flooded the CP market with the associated awry consequences. Thus, presently, to preserve their access to the CP market, firms would use debt with caution especially if they are close to the margin where more or less debt would alter the risk rating.

Moreover, in line with signaling models in corporate finance, asymmetric information would make the response of stock prices to a new debt issue depend on the debt's maturity. In other words, a firm's equity market value would rise if it shortens its outstanding debt average maturity. In this study, a positive relationship between market-to-book equity and the short-term debt maturity usage is consistent with this version of the signaling model.

Finally, if good quality firms perceive that their long-term debt are undervalued, then they will prefer to issue short-term debt. Conversely, in the same circumstances, bad quality firms will issue overpriced long-term debt. Rational investors naturally take these incentives into account when pricing risky corporate debt. The interaction of borrowers' incentives and investors' preferences determines the type of equilibrium that exists in the debt market. Alternative equilibria have been characterized as "pooling" or "separating". If debt issue is costless, only a pooling equilibrium is possible because there is no costly signal available to good quality firms. The market undervalues good firms and overvalues bad firms. However, if debt issue is costly, a separating equilibrium is feasible even when bad firms self-select into the long-term debt market. If the distribution of firms is appropriate, then good firms can implement a short-term borrowing strategy that generates a separating equilibrium. In other circumstances, however, a financial signaling equilibrium cannot be attained (Cline, Walkling & Yore, 2017).

Tax Hypotheses.

The regression results from this study as displayed in Tables 5 and 6 reveal a persistent inverse relationship between debt maturity structure and the term structure. This finding poses a challenge for the tax-based explanation to debt maturity. According to financial theory, if the yield curve is upward sloping as in the case in Nigeria for the study period (1999-2014), the expectations hypothesis implies that in early years, the interest expense from issuing long-term debt is greater than the expected interest expense from rolling short-term

debt. Thus, it has been argued that issuing long-term debt reduces a firm's expected tax liability and consequently increases a firm's current market value. This study could not find evidence in support of this tax-based prediction.

Liquidity risk hypothesis.

The liquidity risk hypothesis predicts a positive relationship between leverage and debt maturity. Following the works of Douglas Diamond (1991, 2004), liquidity risk hypothesis also predicts that borrowers with high credit ratings prefer short-term debt despite the risk of running out of working capital (or liquidity) because perhaps the firm expects its credit rating to improve. Those firms with somewhat lower ratings are predicted to favour long-term debt. In terms of the relationship between leverage and debt maturity, this research finds a positive association between book leverage and debt maturity in 12 out of 17 industries utilized in the study (details of the correlation can be found in appendix 3). This finding is consistent with the liquidity risk hypothesis (Dang, 2011). However, there is an inverse relationship between rating and the use of short-term borrowing which poses challenge for the liquidity risk hypothesis.

Macroeconomic Conditions.

Other measures of the supply side of capital such as bank credit to private sector, monetary policy regime, term spread, government borrowing, GDP growth, all-share index and equity market capitalization all have intuitive signs. There are many interesting macroeconomic interpretations of our results but are expressed here only in sketchy form because of space and time constraints.

1) The positive MPR coefficient indicates that short-term borrowing increases with the monetary policy rate when monetary policy was actually designed to signal the opposite. Thus, the monetary policy regime is ineffective in influencing the availability of short-term bank debt and by extension the level of corporate short-term borrowing. A significant and inverse coefficient would have meant the relevance of monetary policy in the determination of corporate short-term borrowing behavior.

2) A tight monetary policy regime does not affect the level of government borrowing. Government borrowing does not exert a negative impact on short-term debt maturity structure given the positive GB coefficient from the results. Indeed, in an open economy, companies and governments alike can borrow from different countries and in different currencies. Thus, the study does not support the idea that any observed decline in private investments is attributable to a crowd out effect by government expenditure (which are usually financed by borrowing). Rather, the possibility is that government

stimulates the debt market in Nigeria and by extension the level of corporate borrowing.

3) The inverse relations between short-term debt maturity structure and equity market capitalization are consistent with theoretical expectations of a version of market conditions model of debt maturity choice. Buoyancy of the equity market increases the penchant for companies to issue equity, for instance, right issues. At such bullish periods, corporate debt is generally less favoured and if a firm decides to borrow because of financing gap not catered for by equity, then the firm borrows in a reverse pecking order, that is, it issues long term debt (Fama & French, 2012). This result also buttresses a version of the market timing argument in capital structure choice.

4) The inverse relationship between debt maturity structure and economic growth (proxied by GDP growth) is consistent with the greater use of debt during recessions and periods of economic slow-downs than during economic booms. In other words, there is conservative debt usage during booms, that is, periods when economic conditions engender greater corporate profitability because firms do not need 'outside funds'. During economic boom periods, internally generated funds (profits) are expected to be abundant because of the greater likelihood of higher returns on investment for firms relative to crisis periods. These internally generated funds (or retained earnings) should then be sufficient to cater for planned capital expenditures, in which scenario, firms would borrow less consistent with pecking order arguments.

5) The inverse relationship between debt maturity structure and term spread indicates that the term structure of interest rates exerts a downward pressure on short-term borrowing behaviour in Nigeria.

6) The relatively under-developed debt capital market in Nigeria makes banks the dominant providers of debt finance. Thus, the Nigeria financial environment can best be described as a bank-based financial system.

The academic perspective on debt maturity structure has been changing and this study contributes to that. The Modigliani-Miller (1958, 1963) proposition applies to financial claims only. One novel point of emphasis in this research includes the idea that corporate liabilities are broader than mere financial debt. In fact, for some companies, 80-90 percent of their liabilities are non-financial. The value of the firm is the sum of its financial debt and equity plus non-financial debt (often linked to operations). The inclusion of non-financial liabilities implies that a firm's average cost of funds is lower than the firm's overall average cost of funds since many non-financial liabilities are non-interest bearing.

The study shows that the short-term debt maturity structure is directly related to the history of firms' utilization of short-term sources of funds, the age of firms, expected inflation, monetary policy rate and government borrowing. This implies that older firms have higher short-term maturity ratios

than their younger counterparts. To a little degree, the evidence here shows that the use of short-term sources of funds declines with firm size and volatility of earnings (business risk). Thus, firm-specific characteristics exert little or no impact on the choice of firms' debt maturity structure.

5. SUMMARY AND CONCLUSION

This study has extended the evidence on the impact of taxes, firm-specific, industry and macroeconomic factors on the potency of common theories of debt maturity structure (such as contracting-costs, signaling, taxes and liquidity risk hypotheses) to an emerging (Nigerian) market. Debt maturity structure is one of several financing choices that a firm must make in deciding how to finance its operational and investment decisions.

The study has introduced new evidence on the portability of the signaling model of debt maturity structure in Nigeria in which case small firms with credible future prospects signal their quality through the greater use of short-term borrowing despite the greater risk of debt overhang in tandem with the argument of Diamond & He (2014). The signaling model is also supported through the relation between credit rating and debt maturity structure. Unlike prior work, this study considered a wider set of dimensions beyond firm-specific factors and the implications of the findings on the competing theories of debt maturity structure on taxes and macroeconomic variables.

Information asymmetry constitutes the greatest market imperfection in emerging markets like Nigeria and thus the pecking order financing provides the cornerstone to researchers and corporate finance types seeking optimum debt maturity structure to their financing decisions. The hierarchy of debt financing by Nigerian quoted firms seems to follow this order: spontaneous sources of credit (that is, trade credits and other operating accruals), short-term bank debt, short-term market debt (such as bankers' acceptances and commercial papers), long-term bank debt, straight public debt and convertible debt as a last resort. Indeed, convertible debt and redeemable preference shares are rare in the Nigerian financial market.

The supply side of capital is important and, thus, this research complements recent efforts towards uncovering some unexplained quandaries in the debt maturity choices of firms. Credit rating affects firms' access to debt markets. The credibility and extent of work done by rating agencies in Nigeria can be considered for streamlining of framework for their operations. Since they provide some form of certification in a market characterized with asymmetric information, then their operations should be monitored by Financial System Regulators. To access the Commercial Paper market, for instance, there should be clear pre-requisites in order to ensure orderliness and protect against abuse.

The objectivity and independence of rating agencies should also assist banks and other lenders in the pricing of debt contracts (Akintola-Bello, 1993).

The study has demonstrated the significant impact of supply side or macroeconomic factors in the debt maturity choice of Nigerian corporations. The conditions of the debt market exert much more significant impact on maturity structure of debt than the impact generated by firm-specific characteristics. The maturity structure of corporate liabilities is a function of firm's history of the use of funding mix, expected inflation, government borrowing, term spread, monetary policy rate, economic growth and firm age. Dynamic maturity structure models such as auto-regressive models perform better than a simple regression on firm-level characteristics.

Debt maturity is influenced more significantly by factors external to firms than by internal factors. In other words, the opportunities and threats presented by firms' operating environment determine the maturity structure much more than the strengths and weaknesses dictated by firms' fundamentals. Specifically, the supply side factors that exert positive influences on the short-term funds are expected inflation, monetary policy rate and government borrowing. The supply side factors that exert negative influences on short term borrowing are credit rating, term spread, credit to private sector and economic growth. A firm's history of maturity structure of funds and age are also positive influences. Conventional firm characteristics play minor role. Therefore, the industry averages of maturity structure do not provide any distinctive drivers based on firm factors. Generally, short term financing is dominant and this could suggest that the preferred habitat of lenders is the money market. The most dominant sources of short-term debt finance are banks. Uncertainties in the Nigerian market may rationalize lenders' preference for the money market.

Since external factors are more impactful on corporate debt maturity structure, the monetary authority should consider optimal counter-cyclicality of monetary policies. During recessions when firms need to borrow more, low interest rates are needed to stimulate domestic spending and boost GDP. The government needs to support the private sector to get the economy out of a recession, and they in turn need the right incentives to do this.

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-honored 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.

Finally, it seems safe to say that this study has presented some voluminous evidence on the determinants of debt maturity structure of

Nigerian quoted firms. In business and economic research, however, one can never claim to have established a hypothesis beyond question. Additional or alternative tests to issues raised in this study, which would either confirm the validity of the empirical evidence or contradict the obtained results, are suggested.

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