

Determinants of capital structure: Evidence from Nigerian panel data

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Abstract

The paper examines the determinants of capital of 66 firms listed on the Nigerian stock Exchange during the period 1999-2007 using panel data. The results show that there is a negative relationship between leverage and growth opportunities, leverage and tangibility, but positively related to liquidity as well as size. This negative coefficient shows that growing firms do not use debt financing. Negative relationship of profitability with leverage in the three models confirms the implication of pecking order hypothesis which argues that highly profitable firms prefer to finance new investment with internally available funds than through debt finance. It also shows that size and leverage are positively related.

Introduction

Modern corporate finance literature is replete with studies on the determinants of capital structure. However, the issue still remains contentious. Besides, the concerns of most studies on capital structure are in developed and industrialized countries that have many institutional similarities than from data from developing and less developed economies that have different institutional structures. This therefore raises the issue of the validity of the conclusions from theoretical and empirical research carried out in developed and industrialized economies for developing and less developed countries. Hence, this work is motivated by three main factors. The first is lack of consensus among researchers on the factors that determine firm's capital structure. The second is the need to ascertain the validity of the findings on determinants of capital structure in developed economies in developing economies. The last is the dearth of empirical work to understand the factors that influence capital structure of firms in Nigeria. It is expected that the findings of the study will shed light on the determinants of capital structure in

Nigeria, which will be invaluable to corporate managers, and other shareholders in the economy.

The rest of the paper is organized as follows: Section 2 provides the review of literature, section 3 looks at some potential determinants of capital structure as identified in both theoretical and empirical studies. Section 4 explains the data and methodology. Section 5 is devoted to empirical results while section 6 provides the conclusion.

Literature Review

Theories of Capital Structure

A number of theories have been advanced in explaining the capital structure of the firm. The first is the traditional view that states that debt capital is cheaper than equity. The implication of this assertion is that the cost of debt plus the increased cost of equity together on a weighted basis will be less than the cost of equity that existed on equity before debt financing (Barges, 1963). However, Modigliani and Miller (MM) 1958 do not agree with the traditional view. Modigliani and Miller (1958) theory, argue that in perfect capital markets without taxes and transaction costs, a firm's market value and the cost of capital remain invariant to the capital structure changes. This implies that the financial instruments issued by the firm do not affect a firm's productivity and value. However, because of the unrealistic assumptions in MM irrelevance theory, research on capital structure gave birth to other theories.

One of such theories is the trade-off theory which asserts that companies optimize their debt level such that marginal tax advantages of additional borrowing are offset by the increase in the costs of financial distress. In short, since interest payments are tax deductible, raising more debt increases the tax benefits. However, an increase in debt equally increases the probability of default and hence the expected cost of bankruptcy.

The next theory is the pecking order theory pioneered by Myers and Majluf (1984) and Myers (1984). This theory is rooted on the notion of asymmetric information that corporate managers know more about their company's prospects, risk and value than do outside investors. According to the theory, companies prefer to finance their projects

from internally generated cash flows. When this is exhausted, debt will be used and when debt is exhausted, additional equity will be issued. DeAngelo and Masulis (1980) emphasized that each firm has an internal optimal capital structure that maximizes its value.

Signaling effect was proposed by Ross (1977) based on asymmetric information. This theory states that investors believe higher levels of debt will imply higher quality and higher future cash flows. This means that lower quality firms with higher expected costs of bankruptcy at any level of debt cannot follow the steps of higher quality firms by incurring more debt.

Another theory is the Agency theory. This theory suggests that there exists an optimal level in capital structure than can minimize the agency costs. In the framework of this theory, there is a strand of literature that studies the impact of debt on sub-optimal managerial decision making. One important perspective here is the free cash flow approach advanced by Jensen (1986). The approach postulates that high leverage leads to increase in firm value, despite the threat to financial distress, when a firm's operating cash flows exceeds its profitable investment opportunities. To mitigate the agency problems, various methods have been suggested. Jensen and Meckling (1976) suggest either to increase the ownership of the managers in the firm in order to align the interest of managers with that of the owners or increase the use of debt which will reduce the equity base and thus increase the percentage of equity owned by managers. Jensen (1986) suggests that debt would be used as a controlling device to motivate managers to distribute free cash among shareholders instead of wasting it on inefficient activities. Grossman and Hart (1982) suggest that the use of debt increases the chances of bankruptcy and job loss that further motivate managers to use the organizational resources efficiently and reduce their consumption of parkes.

In general, many empirical studies have examined the validity of these theories, but no consensus has emerged among researchers as regards the theory that best explains the capital structure choice. As clearly stated by Myers (2001), there are no universal theory of debt-equity choice and no reason to expect one. All the same, there are several

useful conditional theories, each of which helps to understand the financial structure that firm's choose.

Determinants of capital structure

In this section, we examine some of the determinants of capital structure that have been identified by existing theories and empirical studies. These factors are namely sales growth, tangibility, liquidity, profitability, size and GDP growth.

There are two conflicting viewpoints about the relationship of size and leverage of a firm. The first school of thought believes that large firms do not consider the direct bankruptcy costs as an active variable in deciding the level of leverage because these costs are fixed by constitution and they are a smaller proportion of the total firm's value (Titman and Wessels, 1988). Empirical studies in support of this view include Akhtar and Oliver(2009), Supanvanij (2006), Aktar (2005), Buferna et al. (2005), Deesomsak et al. (2004), Chkir and Cosset (2001), Agrawal and Nagarajan (1990), Fama and French (2002), Huang and Song (2006), Marsh(1982), Taub (1975), and Zou and Xiao (2006). From this view, it is assumed that size and leverage would have a positive relationship. The second school of thought is that of Rajan and Zingales (1995) who believe a negative relationship exist between size and leverage because there is less asymmetrical information about larger firms which will reduce the chances of undervaluation of the new equity issue and would make the large firms to use equity financing. This view is supported by Chen (2004) and Ezeoha (2008). Size (SIZ) is measured in this study as the natural log of sales.

In the case of liquidity and leverage, the trade off theory believes that a positive relationship exist between leverage and liquidity because higher liquidity ratio can support a relatively higher debt ratio due to greater ability of a firm to satisfy short-term contractual obligations on time, but the pecking order theory has a contrary view. This theory believes a negative relationship exist between liquidity and leverage because firms with enough liquidity may use internally available fund to finance investment. Empirical studies in support of this finding include Deesomsak et al. (2004), Mazur (2007) and Viviani (2008). Liquidity (LIQ) is measured as number of days account receivable plus

the number of days of inventory minus the number of days account payable i.e. cash conversion cycle.

Another important firm characteristic found in the literature is future growth opportunities. Firms with high future growth opportunities are expected to use more equity financing because a highly leveraged company may forgo profitable investment opportunities when it expects by undertaking new project the value goes to firm's existing debt holders (Myers 1977). This suggests negative relationship between leverage and growth. This view is supported by Akhtar and Oliver (2009), Supanvanij (2006), Buferna et al. (2005), Barclay and Smith (2005), Lang, Ofex and Stulz (1996), Rajan and Zingales (1995) and Smith and Watts (1992). Pecking order theory, however, suggests a positive relationship between leverage and growth. Empirical findings that show that leverage varies positively with growth include Baskin 1989; Deloof and Verschueren 1998; Viviani 2008; Chen 2004 and Tong and Green 2005. Future growth (SGR) opportunities are measured as percentage change in book value of total assets.

Another determinant is tangibility. Firms with large amount of fixed asset can borrow at a relatively lower rate of interest because they can use these assets as securities to creditors. Therefore, such firms are expected to borrow more as compared to a firm whose cost of borrowing is higher because of having less fixed assets. It is expected that a positive relationship between tangibility of assets and leverage would exist as discovered by Harris and Raviv (1991), Deesomsak et al. (2004), Akhtar (2005), Supanvanij (2006) and Akhtar and Oliver (2009) A few studies such as Bauer (2004), Ferri and Jones (1979), Karadeniz et al. (2009) and Mazur (2007) have shown a negative relationship between leverage and tangibility. Tangibility (TANG) is measured as ratio of fixed assets divided by total assets.

Profitability (PROF) is also a firm characteristic that may influence the capital structure of a firm. Myers and Majluf (1984) pecking order theory which states that firms tend to use internally generated funds first before resorting to external financing expects a negative relationship between profitability and leverage. This negative relationship's found in Rajan and Zingales (1995), Allen (1991), Cassar and Holmes (2003), Deesomsak et al. (2004), Akhtar (2005), Supanvanij (2006), Kim and Berger (2008) and

Akhtar and Oliver (2009). The trade-off theory provides a contrary view because profitable firms are less likely to go bankrupt, and can therefore sustain more debt, thereby capturing more tax advantages. This view is sustained by the free cash flow theory of Jensen (1986).

The other determinant incorporated in the model is the Gross Domestic Product (GDP) measured as the growth rate of GDP¹. The argument is that the increase GDP will have positive impact on leverage. Increase GDP is a measure of positive business environment which tend to enhance firms' borrowing ability in the future. Hence, as GDP increases, firms' will continue to be financed by debt. A positive relationship is expected between GDP growth and leverage. Studies by Demirguc-Kurt and Maksimovic (1996), Booth et al. (2001) provide evidence on the positive relationship between leverage and GDP growth.

Determinants of Leverage according to different theories

Determinants	Pecking order	Trade-off	Signaling	Agency
Growth	+	-	-	-
Tangibility	+	+	Not applicable	-
Liquidity	+	+	Not applicable	-
Profitability	-	+	-	+
Size	+/-	+	-	-
GDPG	+	+	+	+

+: positive impact

-: negative impact

Data and Methodology

The study utilized data obtained from sixty six (66) purposively selected firms from the One hundred (100) listed non financial firms on the Nigerian Stock Exchange (NSE). Most of the data used in this study were sourced from the Annual Reports and

¹ On an individual firm level, the growth rate is a proxy for the investment opportunity set faced by firms (Smith and Watts, 1992) and its effect on the optimal financing of projects (Myers, 1977).

Statement of Accounts of the selected firms. Only firms listed before 1999 and which are still in operation till end of 2007 financial year were chosen².

The sample of firms cut across fifteen (15) sectors of the Nigerian Stock Exchange classification. They are Automobile and Tyre, Breweries, Building Materials, Chemical and Paints, Computer and Office Equipment, Conglomerates, Construction, Food Beverages and Tobacco, Healthcare, Industrial/Domestic Products, Machinery, Packaging, Petroleum, Printing and Publishing, and Real Estate.

In examining the determinants of capital structure of firms in Nigeria, the study employs panel data procedures as the sample contains data across firms and over time. In the estimation, three estimation models were adopted namely, pooled ordinary least square (OLS), fixed effects and random effects. The use of pooled OLS is anchored on the assumption that there is no group or individual effects among the firms. However, as panel contains observation on the same cross sectional units over several time periods, there are most likely to be cross sectional effects on each firm or on a set of group of firms. To take care of this problem, we use other estimation techniques namely, fixed effects and random effects. Fixed effect approach takes into consideration the individuality of each firm or cross-section unit included in the sample by allowing the intercept vary for each firm while assuming that the slope coefficients are constant across firms. Random effects on the other hand assume that the individual or group effects are uncorrelated with other explanatory variables and can be formulated.

Model Specification

In general, the model adopted in the analysis takes the form:

² Financial institutions such as banks, insurance companies etc were purposively excluded from the sample due to the format used in reporting their balance sheets and the different components of working capital such as stock is missing from the balance sheet. This makes their capital structure significantly different from those of non-financial firms.

$$LEV_{it} = \alpha_o + \sum_{it}^n \alpha_i X_{it} + \varepsilon \dots\dots\dots 1$$

Where LEV_{it} is defined as debt ratio of firm I at time t

α_o is the common intercept

$\alpha_1 - \alpha_6$ are coefficients of independent variables

ε = error term

More explicitly, where model 1 is fully specified, for pooled OLS, fixed effects and random effect respectively, one would obtain the following equations:

$$LEV_{it} = \alpha_o + \alpha_1 SGR_{it} + \alpha_2 TANG_{it} + \alpha_3 LIQ_{it} + \alpha_4 PROF_{it} + \alpha_5 SIZ_{it} + \alpha_6 GDPG_{it} + \varepsilon_{it} \dots\dots\dots 2$$

$$LEV_{it} = \alpha_o + \alpha_1 SGR_{it} + \alpha_2 TANG_{it} + \alpha_3 LIQ_{it} + \alpha_4 PROF_{it} + \alpha_5 SIZ_{it} + \alpha_6 GDPG_{it} + \mu_{it} \dots\dots\dots 3$$

$$LEV_{it} = \alpha_o + \alpha_1 SGR_{it} + \alpha_2 TANG_{it} + \alpha_3 LIQ_{it} + \alpha_4 PROF_{it} + \alpha_5 SIZ_{it} + \alpha_6 GDPG_{it} + \varepsilon_{it} + \mu_{it} \dots\dots\dots 4$$

where Leverage is the dependent variable and six main independent variables namely; sales growth, tangibility, profitability, liquidity, size and business environment following the work of Rajan and Zingales (1995), Shah and Hijazi (2004) and Shah and Hhan (2007). The variables are as defined earlier in the literature review.

Empirical results

The descriptive statistics of the variables used in analysis are reported in Table 1. The table shows that all the series display a high level of consistency as their mean and median values are perpetually within the maximum and minimum values of these series. Moreover, the relatively low standard deviations for most of the series indicate that the deviations of actual data from their mean values are very small. The statistics in table 1 equally show that the series are positively skewed and leptokurtic (peaked) relative to the normal except for size and measure of business environment (GDP). Finally, the

probability that the Jarque-Bera statistic exceeds (an absolute value) the observed value is generally low for all the series meaning the rejection of hypothesis of normal distribution at 5%.

Table 1 DESCRIPTIVE STATISTICS

	<i>SGR</i>	<i>SIZ</i>	<i>TANG</i>	<i>LEV</i>	<i>PROF</i>	<i>GDP</i>	<i>LIQ</i>
<i>Mean</i>	2119588	6.393	0.403	4.237	8.188	9871974	1913147
<i>Median</i>	213068.5	6.305	0.336	1.676	9.507	6947820	480847.0
<i>Maximum</i>	79700723	8.320	9.310	638.991	111.58	19492824	46906870
<i>Minimum</i>	-23186855	3.963	0.006	-20.421	-99.84	3194024	-13644254
<i>Std. Dev.</i>	5994663	0.873	0.534	26.925	16.177	5981065	4756876
<i>Skewness</i>	5.471	-0.068	12.563	22.183	-0.766	0.497	4.252
<i>Kurtosis</i>	56.825	2.486	195.778	521.977	15.760	1.636	30.909
<i>Jarque-Bera</i>	74666.69	6.981	935421	6714821	4087.88	70.464	21068.37
<i>Probability</i>	0.000	0.031	0.0000	0.0000	0.000	0.000	0.000
<i>Sum</i>	1.26E + 09	3791.2	239.489	2516.73	4863.41	5.86E +09	1.14E+09
<i>Sum Sq. Dev.</i>	2.13E + 16	451.6	169.258	429884.3	155178.7	2.12E+16	1.34E+16
<i>Observations</i>	594	593	594	594	594	594	594
<i>Cross sections</i>	66	66	66	66	66	66	66

The result of pooled OLS, fixed effects and random effects estimation models are presented in table 2. Under pooled OLS, tangibility and profitability proved to be significant in confidence levels of 5% and 10% respectively. Other variables were not significant. The results of the fixed effects and random effects both showed that sales growth, profitability and size were significant determinants of leverage at 10% level except size random effects which was significant at 5% level. In all the models, the adjusted R² appear very low indicating the existence of omitted variables.

Table 2 Dependent variable Leverage (Lev_{it})

Variable	Pooled OLS	Fixed effects	Random Effects
C	0.720451 (0.23484)	0.561471 (0.216956)	0.720351 (0.25591)
Sgr	-0.00000259 (-0.87943)	-0.0000272*** (-1.827992)	-0.00000259*** (-1.91848)
Tang	-2.203625*** (2.513765)	-2.203519 (-1.186027)	-2.203626 (-1.258585)
Liq	0.0000014 (0.187067)	0.00000206 (0.52559)	0.00000141 (0.382047)
Prof	-0.210725 (-1.843231)***	-0.213669 (-1.788494)***	-0.210725 (-1.851703)***
Siz	12.16966 (0.96810)	13.90188 (1.464596)***	12.16966 (2.732204)**
GDPG	-0.0000071 (-0.607488)	-0.00000694 (-0.865419)	-0.00000709 (-0.936913)
Adj. R2	0.010193	0.11	0.10
F-statistic	8.90763	7.1151	8.907

Discussion of results

The results show that there is a negative relationship between growth opportunities and leverage in the three models but only significant in fixed and random effects models. This is in line with the prediction of the trade-off theory. This negative coefficient shows that growing firms do not use debt financing. This finding conforms to the results of Titman and Wessels (1998), Rajan and Zingales (1995) and Shah and Khan (2007) among others. The popular explanation is that growing firms have more options of choosing between safe and risky firms (Shah and Khan 2007). It is confirmed that since managers are agents of shareholders, they will want to invest on risky projects so as to enhance shareholders' returns. But creditors will not be willing to give funds for such

firms as they will bear more risk for the same returns. In order to compensate for additional risk in growth, companies' creditors will demand risk premium. Hence, in the face of extra cost of debt, growing firms will use less debt and more equity.

Negative relationship of profitability with leverage in the three models confirms the implication of pecking order hypothesis which argues that highly profitable firms prefer to finance new investment with internally available funds than through debt finance. This means that good profitability reduces the need for external debt. This finding supports several previous ones including Wald (1999), Fama and French (2002), Zou and Xiao (2006) and Sheikh and Wang (2010).

Size and leverage are positively related and significant at 10% and 5% levels for fixed effect and random effects model respectively. This result supports the trade off theory which suggests that firm size should matter in deciding an optimal capital structure as bankruptcy costs constitute a small percentage of the total firm value for larger firms and greater percentage of the total firm value for smaller firms. Thus, as debt increases the chances of bankruptcy, smaller firms should have lower debt ratio. Studies by Wald (1999), Fama and French (2006), Huang and Song (2006), Zou and Xiao (2006) and Sheikh and Wang (2010) have reported significant positive relationship between size and leverage.

Tangibility is negatively related to leverage but significant only in the pooled OLS estimation. This finding is consistent with the pecking order theory which suggests a negative relationship between short term debt and asset structure. This should not come as a surprise; the bond market in the country is still relatively small and just developing thereby making the firms to rely on bank debt. Moreover, banks in the country prefer short-term loans on favorable term than risky long-term loans, which makes firms to finance long-term investment using short-term borrowing. It should be pointed out that result should be interpreted with caution, as the coefficient is only significant in the pooled OLS models.

The variable liquidity is positively related to leverage. However, the coefficient is not significant in all the models. This seems to confirm the implication of trade off theory which suggests that higher liquidity ratio can support a relatively higher debt ratio

due to greater ability of a firm to satisfy short-term contractual obligations on time. However, firm conclusion cannot be based on this result as the coefficient is not significant. The same applies to the coefficient of business climate which is negative.

Conclusion

The paper examines the determinants of capital of 66 firms listed on the Nigerian stock Exchange during the period 1999-2007. Based on data availability, six potential determinants of capital structure were analyzed in the paper namely size, profitability, growth, tangibility, business environment and liquidity. The results show that growth opportunities are negatively related to leverage which is consistent with the prediction of the trade off theory. In the same way, leverage is negatively related with tangibility though significant only in pooled OLS estimation. This finding is in tandem with the predictions of pecking order theory, which suggests a negative association between short-term debt and tangibility. The results suggest that leverage is negatively correlated with profitability which is quite consistent with the pecking order hypothesis. In the same way, leverage and size are positively related. This finding supports the view of size as an inverse proxy for the probability of bankruptcy. Liquidity is positively correlated with leverage which is consistent with trade-off theory.

In general, three of the variables are not significant determinants of capital structure. Moreover, the others, namely profitability, size and growth opportunities are only significant at 10%. What is the main implication from these observations? The explanatory power of the capital structure models that are derived from the western setting is limited in the case of Nigeria. This result shows that even though there seems to be some common features in the capital structures of firms in Nigeria and those in the advanced economies, further research is necessary to ascertain determinants of capital structure of Nigeria based on the institutional settings.

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