Determinants of Capital Structure in Selected Chinese Industries: A Panel Data Approach

AKINLOSOTU, Nathaniel Toyosi
Department of Economics, Ambrose Alli University, Ekpoma, Edo State, Nigeria

UKWUOMA, Kingsley
Data Analyst/Research Consultant, RedFox Analytics

Abstract
This study explored the determinants of the capital structure in selected Chinese industries for a period of seven years (from 2011- 2016). Using the *ex-post facto* design, secondary data was collected from the Chinese Stock Exchange (CSE), seven determinants of capital structure were analyzed. These determinants are growth opportunities, size, profitability, and tangibility and non-debt tax shields, ownership structure and sales revenue. The Trade-off theory and Pecking Order theory were employed as the theoretical anchorage of the study. Panel data was used to construct the model with accompanying descriptive statistics such as means and standard deviation and inferential statistics such as Correlation matrix, F-test, Hausman test, LM test, two-stage least squares (2SLS) and General Method of Moments (GMM) to establish endogeneity. Empirical results from the study showed that the growth opportunities generally had direct influence on short-term debt levels and inverse correlation with total debt ratio and long-term debt ratio which pre-empts that all leverage measures are not same and would have a dissimilar and unique impact on the explanatory variables. Same relation was observed for all the variables especially - volatility of earnings, non-debt tax shield and ownership structure in terms of association and effect. The regression results showed that company size and capital structure are directly correlated while volatility of earnings and capital structure are inversely related.
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Introduction
Financing decision represents a fundamental issue in the management of any firm. This is because every business entity just like any organization or institution requires funds for startup, operation and continuous development. However, the question of what is the most efficient and effective way to source funds for business operations and developmental projects borders largely on what is technical known as "capital structure" of firms. The term capital structure simply describes how a firm finances its overall operations and growth by using different sources of funds – debt and/or equity. It refers to the proportion or percentage of capital (money) at work in a business by type. This capital at work in a business encompasses a mix of a company's specific short-term debt, long-term debt, common equity and preferred equity among others.

Owolabi and Inyang (2012) submitted that there are basically two forms of capital namely: equity capital and debt capital. Each has its own consequences that necessitate the need for corporate managers to determine optimal capital structure in terms of risk/reward payoff for shareholders of the firm. This is the reason a firm's capital structure is described as the composition or structure of its liabilities. For example, a firm that sells ₦40billion or US$40million in equity and ₦60 billion or US$60million in debts is said to be 40% equity-financed and 60% debt-financed. The firm's ratio of debt to total financing which totals 60percent can be said to be the firm's leverage or the proportion of capital employed by the firm which came from a source external to the business as an entity.

The pioneering work of Franco Modigliani and Miller (1958) on capital structure (which is commonly known as the MM theory) provoked literature, scholarly expositions and theorists towards explaining the determinants of capital structure in firms. One of the theories that emerged after the pioneering work of Franco Modigliani and Miller is the Trade-Off Theory. The Trade-off theory was first introduced by Kraus and Litzenberger (1973). The Trade-Off Theory suggests that a company finds the balance between the costs and benefits of debt by borrowing until the benefits from the tax deductibility of interests become lower than marginal bankruptcy costs (Baker & Martin, 2011). The benefits of leverage include tax deductibility of the interest payments and the ability to invest in more projects that can increase the value of the company. However, the main disadvantage of debt is that it can make the company insolvent if the funds are not invested wisely. Due to the more expensive cost of securing additional financing, the trade-off theory, recognizes that the capital structure is represented by a specific debt ratio that minimizes the costs of debt and maximises its benefits (Brealey & Myers, 2006).

Myers (1984) opines that if a firm follows Trade Off theory, the firm sets for its self a target debt to value ratio and then gradually drives towards the target. In order to determine the target, there is a balancing of bankruptcy against debt tax shield. Holding the firm's investment plan and asset momentarily constant, a trade off

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of the costs and benefit of borrowing determines the firm's optimal debt ratio. The firm is expected to switch equity for debt till the firm's value is maximized. This implies that in order to maximize the value of a firm, various options may be applied but these options depend largely on where the firm finds advantage. One drawback with the trade-off theory is that the theory fails to explain why some firms with high profitability level display little dependence on debt. Such firms pay large income taxes instead of saving these large amounts by using debt without any danger to their solvency. The Pecking Order Theory (POT) made attempt to justify this fact.

Myers (1984) and Myers and Majluf (1984) are often described as the pioneers or developers of The Pecking order theory of capital structure because the term "Pecking order" was first coined by Myers in 1984. The Pecking Order Theory suggests that firms or companies tend to follow the "pecking order of financing". Chandra (2008) submitted that this order of financing requires that the internal finance or retained earnings come first, followed by debt finance and then by external equity finance. The rationale for this financing approach is that most firms want to minimize their debt burden by employing the least costly financing. Hence, they opt for a less expensive form of financing to reduce debt and retain their earnings. This option is feasible because opting for a more expensive form of financing (as against a less expensive one) comes with a lot of interest payments. The implication of these payments is that they are tax deductible and debt does not dilute the shareholders' earnings. Hence, it is considered more desirable. Jong *et al.* (2011) opined that when the company has projects and all other means of financing, they eventually resort to the last resort of equity financing.

Donaldson (1961) earlier summarized the tenets of the Pecking Order Theory by asserting that the theory does not support the idea that firms should have a unique debt and equity finance combination which minimizes their cost capital. He noted that the theory is of the view that if a firm is looking for a long-term investment finance option, well-structured order of preference needs to be followed; considering the various finance sources available to it. However, the firm's first choice should be the use of internal finance or earnings that are retained instead of external sources. If internal finance sources are insufficient, preferred external finance sources such as borrowing from banks and corporate bonds may be considered. When these two options are exhausted and the need for more funds is eminent, the firm may turn in to its last resort of issuing new shares.

Several studies on determinants of capital structure have been carried out in Nigeria and beyond. Tariq and Hijazi (2006) investigated the determinants of capital structure in the cement industry of Pakistan. The study was based on 5-years financial data of 16 selected cement firms obtained from the State Bank of Pakistan publications. Using the panel data approach, the independent variables of the study included tangibility of assets, firm size, growth of firm and profitability; meanwhile leverage represented the dependent variable. The result of the regression analysis revealed a negative relationship with size and profitability on one hand and positive relationship with tangibility and growth on the otherhand.

Gill, Biger, Pai and Bhutani (2009) investigated capital structure determinants in the United States service industry. Collateralized assets, profitability, non-debt tax shield, firm size, income tax, growth of firm were regressed against leverage. The results of the study revealed a negative relationship between profitability and leverage on one hand while a positive relationship was reported between effective income tax rate and leverage on the other hand. No significant relationship was observed between non-debt tax shield, firm size, growth opportunity and leverage.

Khrawish and Khraiwesh (2010) studied the determinants of capital structure in Jordan. Secondary data were obtained from the annual reports of 30 companies that were listed in the Amman Stock Exchange between the period of 2001 and 2005. Five factors comprising of company size, tangibility of fixed assets, profitability, long-term debt to total assets, and short-term debt to total assets were examined. Using correlation and regression analysis, the results of the study revealed a direct relationship with company size, tangibility, long-term debt, and short-term debt, while an inverse relationship was reported with profitability.

Mishra (2011) investigated the determinants of capital structure in 48 selected profit-making manufacturing firms in India. Data for the study were obtained from annual accounts of 2006 to 2010 period. The analysis was carried out using multiple regression models. The results of the study confirmed pecking order hypothesis, the leverage was found to be negatively related to profitability. Asset tangibility was found to be positively related to leverage. In contrast with theory, the tax rate was found to be inversely related to leverage.

Sheikh and Wang (2011) explored the factors that affect capital structure of manufacturing firms in Pakistani firms. The investigation was conducted using panel data procedures for a sample of 160 firms listed on the Karachi Stock Exchange during 2003-2007. The results revealed that there is a negative relationship between debt ratio (as the dependent variable) and profitability, liquidity, earnings volatility, and tangibility (as independent variables); while firm size had a direct relationship with debt ratio. There was no significant relationship identified between the dependent variable of debt ratio and the independent variables of non-debt tax shields and growth opportunities.

Hassan (2011) investigated the determinants of capital structure in listed insurance firms in Nigeria using data obtained from annual report of the sampled firms for the period 2001-2010. They used five explanatory variables to measure their effects on debt ratio. Multiple regressions were employed as tool of analysis. The result revealed that all the explanatory variables had statistically and significantly influence on the explained variable. The results

approved the prediction of Pecking Order Theory in the case of profitability and Trade-Off Theory in case of tangibility variables. The growth variable supported the agency theory hypothesis whereas size variable confirmed to the asymmetry of information theory.

In Malaysia, Zabri (2012) surveyed the determinants of capital structure among small and medium scale enterprises in Malaysia with data obtained from 50 award-winning enterprises from 1998 to 2010. The data analysis was carried out using regression analysis. Seven factors namely: profitability, size, tangibility of assets, growth of firm, age of firm, non-debt tax shield and liquidity were considered in the analysis. The results of the study revealed that three out of the seven selected firm's characteristics (liquidity, tangibility of assets and non-debts tax shield) were found to have statistically significant relationship with firm's capital structure.

Akinyomi and Olagunju (2013) examined the determinants of capital structure in eighty-six manufacturing firms listed in the Nigerian Stock Exchange. Using the descriptive research design, the sampled firms were selected using the simple random sampling method. Secondary data obtained from the annual accounts of 24 randomly selected manufacturing firms for 10-years period culminating in 240 firm-year observations. The results of the regression analysis revealed that leverage (a measure of capital structure) has inverse relationship with firm size and tax on one hand had a direct relationship with tangibility of assets, profitability and growth on the other hand.

Ishaya, Garba and Odudu (2013) examined the determinants of capital structure in Nigerian Chemical and Paints companies listed in Nigeria, for a period of five years from 2005 to 2009. The study employed secondary data from the annual reports and the Nigerian Stock Exchange (NSE) fact books covering the study period Ordinary least square (OLS) was employed to determine whether relationship exists between leverage ratio and various independent variables in the model. The study reveals that for the Nigerian Chemical and Paints sector, tangibility and profitability had significant impact on leverage at 1% level, while size, growth and age have insignificant impact on the dependent variable. It also shows that the coefficient of the two significant explanatory variables, which are tangibility and profitably are inverse. The effect of tangibility on capital structure suggests a negative relationship between tangibility and leverage contrary to both trade off theory and pecking order theory. Also the relationship between growth rate and level of leverage contradict both the pecking order and the tradeoff theory.

Kiran (2013) conducted a study on the determinants of capital structure in Pakistan. Secondary data from audited annual reports were obtained from the textile, chemical, fuel and energy sectors of the economy. Using leverage as the dependent variable while size, non-debt tax shield, growth, earnings volatility, profitability and tangibility of assets as the independent variables; the study employed correlation and regression analysis. The results revealed a negative relationship between earnings volatility, growth of firm, profitability and leverage on one hand, meanwhile a positive relationship was established between firm size, non-tax shield, tangibility of assets and leverage on the other hand.

Oppong-Boakye, Appiah and Afolabi (2013) explored the determinants of capital structure among 33 listed and non-listed companies during the period 2003-2007 in Ghana. Six factors of profitability, assets' tangibility, size of firm, business risk, growth and tax were examined. Multiple regression analysis of pooled-cross sectional and time-series observations was employed in the analysis. The results revealed that leverage has a direct relationship with profitability, assets tangibility, size, business risk on one hand; but an inverse relationship was observed with growth and tax on the other hand.

Igbinosa and Chijuka (2014) examined the analysis of the determinants of capital structure of Nigeria companies for 2013. The cross-sectional least squares regression was applied to determine the impact of two independent variables on debt ratio. The independent variables are represented by company size and profitability. The result showed that profitability is not a significant determinant and had an inverse impact on leverage while the impact of company size was not confirmed in the model.

Ishaya and Olayiwola (2014) examined capital structure and profitability of the Nigerian listed firms. From the Agency Cost Theory perspective, a sample of seventy (70) out of population of two hundred and forty-five firms listed on the Nigerian Stock Exchange (NSE) for a period of ten (10) years: 2000 - 2009 was covered in the period under review. Panel data for the firms were generated and analyzed using fixed-effects, random-effects and Hausman Chi-Square estimations. Two independent variables which served as surrogate for capital structure were - debt ratio (DR) and equity (EQT) while profitability (PROF) was the only dependent variable. The result showed that DR was inversely related with PROF but EQT was directly related with profitability.

Anarfo (2015) examined the determinants of capital structure of banks in Sub-Sahara Africa by employing the panel data techniques. The dependent variables of the study were short-term debt ratio (STDR), long-term debt ratio (LTDR) and the total debt ratio (TDAR). The independent variables were: return on asset (ROA), asset tangibility (TANG), Size of the bank (SIZE), growth rate of total assets (GROWTH), corporate marginal tax rate (TAX), GDP growth rate (GDPGR), interest on loans (INTEREST), inflation rate (INFLR). The results indicated that the return on asset, size, asset tangibility, growth rate of banks and inflation rates are statistically significant in determining the capital structure of banks in Sub-Sahara Africa.

Adegbile (2015) assessed the impact of corporate governance attributes on capital structure of listed firms in the Nigerian food and beverages industry from 2003 to 2012. The study uses leverage (LEV) as dependent variable

while board size (BSZ), board composition (BCO), managerial shareholding (MSH), tangibility of assets (TAN) and growth (GRW) are the explanatory variables. The sample size of the study was derived using sample selection formula, from which six out of nine quoted firms emerged as the sample size after giving all the firms the equal chance of being picked through random sampling technique. The data generated from annual reports of the sample firms are analyzed using Pearson correlation coefficient and multivariate regression analysis. The results revealed that tangibility of assets and growth has positive relationship with leverage while board size, board composition and managerial shareholding have negative relationship with leverage.

Babatunde (2016) empirically investigated capital structure determinants in Nigeria using a sample of 50 companies listed on the Nigeria Stock Exchange from 2001 to 2010. The relationship between the short-term and long-term debt and four explanatory variables were observed. The results of the cross-sectional Ordinary Least Squares (OLS) regression revealed that the static Trade-Off theory and Agency Cost theory were relevant to Nigerian companies whereas there was a little evidence in support of Pecking Order theory. The result showed that profitability, growth, firm size and tangibility were explanatory variables of capital structure.

From the foregoing, studies on the determinants of capital structure has been carried out in various countries in Nigeria and other nations using companies quoted on the Nigeria, Stock Exchange, Amman Stock Exchange, Jordan and Ghana Stock Exchange market among others. In China which has a vast labour force like Nigeria, it is not to the researchers' knowledge that any study on the determinants of capital structure has been carried out using selected industries in the Chinese economy. Hence, a knowledge gap exists. To fill this gap, this paper sought to investigate the determinants of capital structure in selected Chinese industries using the panel data approach. To achieve this broad objective, the specific objectives of the study are to:

1) examine the trend of total debt ratio (TD), long-term debt ratio (LD), short-term debt ratio (SD) and other determinants of capital structure in Chinese industries;
2) determine the relationship among total debt ratio (TD), long-term debt ratio (LD), short-term debt ratio (SD), return on equity (roe), tangibility of asset (tang), previous year size (t1sz), fixed assets at the end of the period (grow), operating income at the end of the period (vo), non-debt tax shield (ndts), ownership structure (SO) and sales revenue (SE) in Chinese industries;
3) determine the predictors of capital structure in Chinese industries; and
4) make policy recommendations and draw out lessons for Nigeria based on the fall out of the result

Hypotheses
The following hypotheses were formulated and tested in the study:

1). There is no significant relationship among total debt ratio (TD), long-term debt ratio (LD), short-term debt ratio (SD), return on equity (roe), tangibility of asset (tang), previous year SIZE (t1sz), fixed assets at the end of the period (grow), operating income at the end of the period (vo), non-debt tax shield (ndts), ownership structure (SO) and sales revenue (SE) of Chinese industries.

2). Capital structure is not significantly predicted by tangibility of asset (tang), previous year SIZE (t1sz), fixed assets at the end of the period (grow), operating income at the end of the period (vo), non-debt tax shield (ndts), ownership structure (SO) and sales revenue (SE) of Chinese industries.

Methods
The *ex-post facto* research design was adopted for this study. According to Salvatore and Reagle (2002), the *ex-post facto* research design is aimed at determining association and causation between a dependent and one or more independent variables. They are also called causal –comparative designs because they help to determine the extent to which a set of determinants causes changes in another variable. Hence, this study sought to determine the association and causation from a set of independent variables to a dependent variable (capital structure) in selected Chinese in industries.

Secondary data for a period of seven years (from year 2011 to 2016) were collected from selected Chinese firms quoted on the Chinese Stock Exchange (CSE) market. Only firms operating in four major industries namely: a) transportation, b) manufacturing, c) real estate, and d) electricity, gas and water production were covered among others. Seven determinants of capital structure - growth opportunities, size, profitability, tangibility, non-debt tax shields, ownership structure and sales revenue were captured in the model and analysed. The book value was used to compute the total assets of the company and three definitive approaches were used to explain the company's capital structure. The three approaches to the company's capital structure are namely: total debt ratio (TD), long-term debt ratio (LD) and short-term debt ratio (SD). Panel data was used to construct the model with accompanying descriptive statistics such as means and standard deviation and inferential statistics such as Correlation matrix, F-test, Hausman test, LM test, two-stage least squares (2SLS) and General Method of Moments (GMM) to establish endogeneity. The theoretical signs of the explaining variables were found to be mixed. The uniqueness of the model answers the question of the validity and appropriateness of the OLS model examining whether there is a presence of fixed effect or a random effects in the dynamic model stated below:

$ROE_{it} = T_o + T_1 (Tang)_{it} + T_2 SZ_{it} + T_3 grow_{it} + T_4 VO_{it} + T_5 ndts_{it} + T_6 SO_{it} + T_7 SE_{it} + V_{it}$

Table 1: Summary Description of the Determinants, Theoretical sign expectation and Proxies			
Determinants	Trade-Off Theory	Pecking Order Theory	Proxies
Growth opportunities (grow)	-	+ / -	Market-to-book ratio
Size (SZ)	+	-	The natural log of total assets
Profitability	+ /-	-	net income to total assets
Tangibility (Tang)	+	-	net fixed assets to total assets
Volatility (VO)	+ /-	-	Operating income$_{bg}$/total assets
Non-Debt Tax Shields (NDTS)	-	-	depreciation to total assets

Source: Authors   *Note: bg denotes beginning period*

Results

The results of the analysis and their interpretations are presented in the tables below. Table 2 summarizes the basic features of the data which are specifically included to form the basis of the quantitative analysis of the data according to year (time) classification for total debt ratio (TD), long-term debt ratio (LD) and short-term debt ratio (SD).

Table 2: Descriptive Analysis by Year Classification					
Total debt ratio (TD)					
Variables	Obs	Mean	Std. Dev	Min	Max
2011	882	0.4950	0.1906	0.0071	0.9270
2012	882	0.5020	0.1906	0.0314	0.9478
2013	882	0.5030	0.1950	0.0446	0.9444
2014	882	0.4950	0.1981	0.1111	0.0163
2015	882	0.4830	0.1977	0.1107	0.1717
2016	882	0.4800	0.1980	0.0370	0.9856
Long-term debt ratio (LD)					
Variables	Obs	Mean	Std. Dev	Min	Max
2011	882	0.0985	0.1150	0.0000	0.6454
2012	882	0.1058	0.1145	0.0000	0.6611
2013	882	0.1108	0.1142	0.0000	0.6783
2014	882	0.1080	0.1112	0.0000	0.6778
2015	882	0.1091	0.1107	0.0000	0.6711
2016	882	0.3746	0.1717	0.0000	0.6944
Short-term debt ratio (SD)					
Variables	Obs	Mean	Std. Dev	Min	Max
2011	882	0.3974	0.1732	0.0028	0.9270
2012	882	0.3970	0.1754	0.0205	0.9403
2013	882	0.3924	0.1753	0.0179	0.9442
2014	882	0.3878	0.1777	0.0163	0.9620
2015	882	0.3746	0.1717	0.0129	0.9791
2016	882	0.3660	0.1705	0.0225	0.9736

Source: Authors' Computation

Data in Table 2 shows that the mean values of the variables are not a 'perfect representation' of the data. The standard deviation shows the average distance from the mean and shows how spread out the data is. A relatively large dispersion was observed especially for TD and with less dispersion for LD. The TD value for the sample period was highest for 2013 and 2012 with a relatively moderate dispersion level at 0.1950 and lowest dispersion at 0.1906 respectively. LD mean value was highest in the start of the sample period 2011. However as the mean value increased, the standard deviation moderated until 2016. This shows values that are consistent with the industry long-term liabilities and total asset value which might make for less cumbersome company valuation. The SD value for the sample period was highest for 2011 and 2012 with a relatively moderate dispersion level at 0.1732 and 0.1754. The summary description of the dependent and explanatory variables is presented in Table 3.

Table 3: Summary Description of the Dependent and Explanatory Variables								
Stats	**roe**	**tang**	**t1sz**	**grow**	**vo**	**ndts**	**SO**	**lse**
Mean	0.0576	0.2419	22.2655	2.8085	0.0488	0.0218	0.0398	2646.5000
p50	0.0640	0.2056	22.1349	0.0200	0.0334	0.0184	0.0000	2646.5000
Sd	0.6365	0.1775	1.1996	174.2139	0.2116	0.0163	0.1181	1527.8130
Variance	0.4051	0.0315	1.4390	30350.47	0.0448	0.0003	0.0139	2334213.0 0
N	5292	5292	5292	5292	5292	5292	5292	5292
Range	46.2657	0.9709	8.047798	12651.14	5.4569	0.1263	0.8297	5291
Min	-45.5508	0	19.0976	-1	-2.5129	0	0	1
Max	0.7149	0.9709	27.1454	12650.14	2.944	0.1263	0.8297	5292

roe is the return on equity, tang is tangibility of asset (=fixed assets/total assets), t1sz is the previous year natural logarithm of SIZE, grow is fixed assets at the end of the period, vo is operating income at the end of the period, ndts is non-debt tax shield (=annual depreciation/total asset), SO is ownership structure and SE is the natural logarithm of sales revenue. SE was encoded/transformed from a string variable to float numeric for computational purpose with a new name 'lse'. p50 is simply the median of the distribution.

The explanation of descriptive statistics in Table 3 cuts across the dependent variable or explained variable and goes deep into the basic ingredients of the explanatory variables of capital structure. Table 3 shows that the Size mean value is higher than other explaining variables given the magnitude of the data points. However the standard deviation and variance provides an analytical standard to describing the basic features of the data. The mean and median value of Return on Equity (ROE) is slightly lower than that of volatility (VO), followed by ownership structure (SO) and non-debt tax shields (ndts).

Table 3 also shows that tang, *VO* and *ndts* have average values of approximately 0.2419, 0.0488 and 0.0218 respectively of total assets. The market valuation is fair on average book value of the companies. It was also observed that in the sample period, the variables were generally found to be one standard deviation below or slightly above their respective mean, except in the case of *grow* and the natural logarithm of sales revenue (lse) and will further conclude that there is a reduced volatility of the observations. The range is simply the difference between the maximum and the minimum value and is of less relevance to understanding the behaviour of the data. The measure of association between each of the dependent and independent variables are given below.

Table 4: Correlation Matrix

	Statistics (n=5292)	td	ld	sd	roe	tang	t1sz	grow	vo	ndts	SO	lse
td	r-coefficient	1										
	n	5292										
ld	r-coefficient	0.4654	1									
	p-value	0.0000										
sd	r-coefficient	0.8163	-0.1313	1								
	p-value	0.0000	0.0000									
roe	r-coefficient	-0.0528	0.0033	-0.0613	1							
	p-value	0.0001	0.8127	0.0000								
tang	r-coefficient	-0.0046	0.2205	-0.1491	-0.0202	1						
	p-value	0.7367	0.0000	0.000	0.1414							
t1sz	r-coefficient	0.4763	0.4484	0.2409	0.0178	0.0772	1					
	p-value	0.0000	0.0000	0.0000	0.1953	0.0000						
grow	r-coefficient	-0.0038	-0.0072	0.0005	0.0000	0.0108	-0.0023	1				
	p-value	0.7845	0.6003	0.9716	0.999	0.4308	0.8671					
vo	r-coefficient	0.0771	-0.0569	0.1234	0.0568	-0.0781	-0.0341	0.0277	1			
	p-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0132	0.0437				
ndts	r-coefficient	-0.0975	0.0146	-0.1188	-0.0274	0.7716	-0.0157	0.0098	-0.0781	1		
	p-value	0.0000	0.2879	0.0000	0.0463	0.0000	0.2525	0.4753	0.0000			
SO	r-coefficient	0.0448	0.1038	-0.0176	0.0096	0.1148	0.155	0.0569	0.0438	0.0509	1	
	p-value	0.0011	0.0000	0.2012	0.4858	0.0000	0.0000	0.0000	0.0014	0.0002		
lse	r-coefficient	0.0518	0.017	0.0469	0.0092	0.028	0.0077	-0.0095	0.0093	0.0188	-0.0018	1
	p-value	0.0002	0.2152	0.0006	0.5055	0.042	0.5779	0.4908	0.4991	0.1719	0.8947	

Source: Authors' Computation from STATA

The numerical value of the correlation coefficient as shown in Table 4 tells us the strength of the relationship and correlation direction can either be positive or negative. Positive and negative correlation implies direct or inverse association between the variables respectively. A positive and high correlation was observed in most cross-currency association which further. The analysis of correlations between the independent variable of explaining variables and the dependent variable of explained variable (capital structure) indicates that there is little presence of collinearity at random occurrence empirically defined by a correlation coefficient of less than 0.30. This is evidence that collinearity is not a serious problem (Aivazian, Ge & Qiu, 2005). A look at matrix shows that TD, LD and SD are dependent variables; therefore always only one of them is explained by any model. Concerning the explanatory variables, relatively high correlation coefficients (higher than 0.5) between ndts and tang can be observed which is a signal for possibility of multicollinearity. Most of the association was found to be significant

except grow which reported no significant relationship with other variables.

The result reports that tlsz was found to be positively correlated with short-term debt ratio. It is suggested that size of company is positively correlated with capital structure. Some scholars have provided empirical verification to such positive correlation (Marsh, 1982; Harris & Raviv, 1991; Rajan & Zinganles, 1995). The empirical analysis in Table 4 supports the result that company size and capital structure are positively correlated. The research hypothesized that VO is negatively correlated with capital structure. However, this was only true for long-term debt ratio where the correlation was found to be inversely correlated. Furthermore, this is not entirely distinct from Titman and Wessels (1988)'s findings. In investigating the determinant of capital structure in the firms, the Baseline regression analysis with F-test was used in the study. The result is presented in Table 5.

Table 5: Baseline Regression Analysis with F test

	Model 1	Model 2	Model 3
Variables	td	ld	sd
roe	-0.0212***	-0.000382	-0.0208***
	0.000	-0.856	0.000
tang	0.0861***	0.272***	-0.185***
	0.000	0.000	0.000
t1sz	0.0777***	0.0387***	0.0390***
	0.000	0.000	0.000
grow	-0.00000256	-0.00000479	0.00000223
	-0.848	-0.532	-0.864
Vo	0.0860***	-0.0184**	0.104***
	0.000	-0.004	0.000
Ndts	-1.732***	-2.163***	0.432
	0.000	0.000	-0.050
SO	-0.0562**	0.00928	-0.0655***
	-0.005	-0.421	-0.001
lse	0.00000618***	0.000000608	0.00000557***
	0.000	-0.486	0.000
_cons	-1.236***	-0.774***	-0.463***
	0.000	0.000	0.000
N	5292	5292	5292
F	223.5	250.5	82.75
df_m	8	8	8
df_r	5283	5283	5283
p-values in parenthesis	*p<0.05,	**p<0.01,	***p<0.001

Source: Authors' Computation from STATA

From Table 5, result shows that there is no consistent theoretical prediction in the influence of capital structure variables (leverage); td, ld and sd on the explaining variables. However, in the empirical analysis, a negative relationship between ROE and each of the dependent variables is observed. This study provides the same result. ROE is statistically significant in the total debt ratio and short-term debt ratio model but not highly statistically significant in the long-term debt ratio model as reported in table 5. The apriori signs are also negative across the three relations confirms the pecking-order theory rather than static trade-off models. It can be inferred that if profitability increases by 1percent, company's debt will reduce by 2 percent, 0.03percent and 2percent respectively for td, ld and sd. Also, a positive relationship is expected between capital structure variables and tangibility but an exception was observed in the short-term debt ratio model, though the variable was found to be significant across the leverage measures, model 3 fails to conform to the trade-off theory pointing to the connection that tangibility of assets negatively impacted on leverage by 18%. The empirical result is connected to developing countries majorly.

There are significant relationships between model 1 and growth opportunities, size, profitability and tangibility, non-debt tax shields, volatility, share ownership structure and sales revenue which are all the explaining variables in model (leverage) 1. Model 2 shows a drop in the variables return on equity (ROE), growth opportunities (grow), ownership structure (SO) and natural logarithm of sales revenue which were found not to be significant at all levels. Model 3 shows that grow fell out of the significance benchmark while non-debt tax shields (ndts) explanatory variable has insignificant effects on leverage 1 at just 10percent level of significance. In model 1, Growth opportunity has a not statistically significant negative effect which negates the trade-off theory. Profitability had an inverse effect at 1percent level on leverage model 1 which supports the pecking order theory. There are less significant relationships between model (leverage) and ROE, growth opportunities (grow),

ownership structure (SO) and natural logarithm of sales revenue which speaks volume to LD as a leverage.

Theoretical prediction about the relationship between volatility and leverage is quite vivid. Since VO is statistically significant in all the models, it can be concluded that operational risk and earnings capacity is key to reducing bankruptcy cost and at such very important in the empirical analysis. For non-debt tax shields, the results conform to a priori expectation, a negative relation to leverage as indicated in model 1 and 3. Ndts is statistically significant in model 1 and 2 but falls off the significance benchmark for 1% and 5% in model 3. According to the high computed values of the F-test, the overall significance of the model is established when the leverage is expressed in market value than in book value. The probability of its value (0.000) is less than the 0.05 and 0.01 critical levels. Thus, the F-statistics of 223.5, 250.5 and 82.75 respectively for models 1, 2 and 3 and by rules of thumb, since the F-statistics exceeds 2 with an expected probability value of less than 0.05 and 0.01, we can conclude that the respective values adequately explain the leverage models and hence reject the null hypothesis that the model is not significant in explaining the variations in company leverage.

Fixed Effects Regression Analysis

In its simplest (bivariate) form, the model of choice will be drawn from the assumption of the Ordinary and Generalised Least Squares (O/GLS) Fixed Effect (FE) regression that shows the relationship between company's capital structure as a dependent variable of explained variable and the independent variables. The FE Regression Analysis with Hausman Specification Test of Significance is shown in Table 6

Table 6: FE Regression Analysis with Hausman Specification Test of Significance

	Model 1	Model 2	Model 3
Variables	**td**	**ld**	**sd**
roe	-0.0223***	-0.000659	-0.0217***
	0.000	-0.754	0.000
tang	0.0823***	0.271***	-0.189***
	0.000	0.000	0.000
t1sz	0.0816***	0.0395***	0.0421***
	0.000	0.000	0.000
grow	0.00000183	-0.00000405	0.00000587
	-0.890	-0.598	-0.650
vo	0.0757***	-0.0215***	0.0972***
	0.000	-0.001	0.000
ndts	-1.783***	-2.175***	0.392
	0.000	0.000	-0.073
SO	-0.0665***	0.00711	-0.0736***
	-0.001	-0.538	0.000
lse	0.00000649***	0.000000677	0.00000581***
	0.000	-0.437	0.000
_cons	-1.322***	-0.791***	-0.530***
	0.000	0.000	0.000
N	5292	5292	5292
F	241.4	251.6	90.49
df_m	13	13	13
df_r	5278	5278	5278
p-values in parenthesis	*p<0.05,	**p<0.01,	***p<0.001
p-value Hausman	116.5(0.000)	17.23(0.0041)	78.66(0.000)

Fixed-effects GLS regression grouped by year variable. Hausman Diagnostic test for model specification: FE = consistent under Ho and Ha; and RE = inconsistent under Ha, efficient under Ho; both obtained from xtreg. "Within" The R-squared from the mean-deviated regression, i.e. the Ordinary r-squared from running OLS on the transformed data is used.

Table 6 summarizes the results of the fixed effects in company structure and we can verify the consistency with prior expectation, with some exceptions. It is found that when the company's operating results increase by 1% (tang, tlsz & vo), the company reduces debt by about 7 to 8% and a variation in sales revenue impacts positively on indebtedness but at a rather low magnitude given the superiority of profitability over revenue from sales in company valuation. ROE impacts negatively on indebtedness as expected given the theoretical negative relationship between profitability and leverage. The coefficients of profitability, VO, SO and lse are all statistically significant at 1% and 5%, respectively in model 1 and 3, and have the expected signs and, therefore, the underlying

hypotheses H4, H5 and H6 are validated.

SIZE proxied by previous year of the natural logarithm of the total asset is positively related to indebtedness which also conforms to theoretical expectation. An increase in size either by sales, number of employees and total assets is expected to increase debt as evident in models 1, 2 and 3 and statistically significant at 1% and 5%. Validation of H2 is according the results obtained in Cortez & Susanto (2012), Rogão & Serrasqueiro (2008), Sayilgan et al (2006), Gaud et al (2005), Frank & Goyal (2004) and the validation of H5 is according to the result obtained by Sayilgan et al (2006) for non-financial companies in Turkey.

Result of the Random Effect (RE) regression analysis with LM test is shown in Table 7

Table 7: RE Regression Analysis with LM test

Variables	Model 1	Model 2	Model 3
	td	ld	sd
roe	-0.0212***	-0.000382	-0.0208***
	0.000	-0.856	0.000
tang	0.0861***	0.272***	-0.185***
	0.000	0	0.000
t1sz	0.0777***	0.0387***	0.0390***
	0.000	0	0.000
grow	-0.00000256	-0.00000479	0.00000223
	-0.848	-0.532	-0.864
vo	0.0860***	-0.0184**	0.104***
	0.000	-0.004	0.000
ndts	-1.732***	-2.163***	0.432
	0.000	0	-0.050
SO	-0.0562**	0.00928	-0.0655***
	-0.005	-0.421	-0.001
lse	0.00000618***	0.000000608	0.00000557***
	0.000	-0.486	0.000
_cons	-1.236***	-0.774***	-0.463***
	0.000	0	0.000
N	5292	5292	5292
df_m	8	8	8
p-value of LM(Prob>Chi)	0.0000	0.0025	0.0000
p-values in parenthesis	*p<0.05,	**p<0.01,	***p<0.001

Source: Authors' Computation from STATA

Table 7 summarizes the results of the random effects in company structure and reports the p-value of the Langrage Multiplier test and we can verify the consistency with prior expectation, with some exceptions. Similar variable relationships were found comparable to the fixed effects (FE) model in table 5. From table 6 above, lower probability values were obtained (p<0.00) for models 1, 2 and 3 and as such we do not reject Ho and conclude that there is no serial correlation.

Table 8a and 8b presents the regression results for ROE (profitability) as a dependent variable on the independent variables with the logarithm of operating income *lse* used as the instrumental variable of roe, tlsz, tang, grow, ndts and SO respectively. The table provides the 2SLS and GMM methods and also carried out a test of endogeneity to confirm if se is truly endogenous.

Table 8a: Instrumental Variable Case : 2SLS

Variable	Coeff	Std. Error	P-value	95% Conf. Interval	
t1sz	-0.7117619	0.2691663	0.008	-1.23932	-0.18421
tang	0.9359213	0.396945	0.018	0.157924	1.713919
grow	-0.0000543	0.0000208	0.009	-9.5E-05	-1.3E-05
ndts	-10.17973	4.023085	0.011	-18.0648	-2.29463
SO	1.086644	0.4160474	0.009	0.271206	1.902082
_cons	15.85763	5.962287	0.008	4.171761	27.54349
R^2			0.0035		
Instrumented	tlsz				
Instruments	tang grow ndts SO vo lse				
H_0	Variables are exogenous				
Test for Endogeneity					
Robust score	chi2(1)	30.304 (p = 0.0000)			
Robust regression	F(1,5285)	30.304 (p = 0.0000)			

Table 8b: Instrumental Variable Case : GMM

Variable	Coeff	Std. Error	P-value	95% Conf. Interval	
t1sz	-0.668801	0.2487604	0.007	-1.15636	-0.18124
tang	0.851417	0.3617127	0.019	0.142473	1.560361
grow	-0.0000512	0.0000193	0.008	-8.9E-05	-1.3E-05
ndts	-9.298924	3.657526	0.011	-16.4675	-2.1303
SO	1.018554	0.384428	0.008	0.265089	1.772019
_cons	14.90865	5.510764	0.007	4.107747	25.70954
R^2			0.0035		
Instrumented	tlsz				
Instruments	tang grow ndts SO vo lse				
H_0	Variables are exogenous				
Test for Endogeneity					
GM C Statistic	chi2(1)	57.3282 (p = 0.0000)			

Source: Authors' Computation from STATA

The Table 8a and 8b for 2SLS and GMM respectively show that the explaining variables were all significant at 1% and 5% except tang and ndts which both slightly fell of the 1% benchmark for variable significance. Most of the variable relationship by evidence of the coefficients sign conforms to theoretical relationships.

Tlsz shows that each additional year of company expansion is related to 71% and 66% fall in profitability for the 2SLS and GMM estimates while the positive coefficient sign of tangibility implies that a 1% increase in tang will result to an 93% and 85% rise in debt-asset-ratio in other words, companies with higher tangible asset ratio can win more debt financing. This relation is more evident in the long-run as reported in table 3: correlation matrix.

The test for endogeneity will establish whether the OLS analysis is sufficient for analysis with introducing the IV regression analysis. The p-value=0.0000 implies that we are correct to treat the logarithm of operating income se as an endogenous variable size as an endogenous variable.

The estimated coefficients 2SLS and GMM are slightly different. These differences are due to sample adjustment and the results of asymptotically random sample distribution and also because of the sample size of the study, the estimated coefficients for 2SLS yielded higher estimated coefficients and higher standard errors compared to the GMM.

Conclusion

It was discovered that grow was directly correlated with capital structure and listed companies are more likely to acquire bank loans, so enterprises with more growth plans prefer growth induced internal debt financing. Empirical results suggested that the growth opportunities generally appear to have direct influence on short-term debt levels and inverse correlation with total debt ratio and long-term debt ratio which pre-empts that all leverage measures are not same and would have a dissimilar and unique impact on the explaining variables. Same relation was observed for all the variables especially - volatility of earnings, non-debt tax shield and ownership structure in terms of association and effect. Most of the variables were generally found to be one standard deviation not farther away from their mean with notable exception in growth opportunities and natural logarithm of sales revenue with moderate volatility in other variables.

The regression results supported the result that company size and capital structure are directly correlated. The research hypothesized that volatility of earnings is inversely correlated with capital structure. However, this is only true for long-term debt ratio where the correlation was found to be inverse; corroborating the result of Titman and

Wessels (1988). Theoretical prediction about the relationship between volatility and leverage was quite vivid. Since VO is statistically significant in all the models, it can be concluded that operational risk and earnings capacity are key to reducing bankruptcy cost and at such very important in the empirical analysis.

Future research would do well to sharpen the understanding and evaluation of the determinants of capital structure especially with regards to nature of operating income and economy so as to bridge the limitations especially between what is applicable in developing and advanced economies. Results obtained from total-debt ratio, long-term debt ratio and short-term debt ratio may pave way for analyzing leverage effect on liquidity and credit risk moving beyond operational risk. This would open the way for identifying and including other variables that would add substance to the company capital structure.

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