DETERMINANTS OF CAPITAL STRUCTURE OF BANKS: EVIDENCE FROM SUB-SAHARA AFRICA

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ABSTRACT

This study seeks to examine the determinants of capital structure of banks in Sub-Sahara Africa. This study has employed the use of panel data techniques to analyze the determinants of capital structure of banks in sub-Sahara Africa The dependent variables used in 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 from Levin-Lin-Chu and Im-pesaran-shin unit root test show that all the variables were stationary in levels. The results also indicate 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. However, corporate marginal tax rate, GDP growth rate and the interest rate on loans are not statistically significant in determining banks capital structure in Sub-Sahara Africa.

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Keywords: Capital structure, Return on asset, Total debt ratio, Long term debt ratio, Short term debt ratio, Asset tangibility.

Contribution/ Originality

Most empirical studies that examine the determinants of capital structure have been done for developed or specific country and there is little evidence in Sub-Sahara Africa. This study contributes in the existing literature by examining the determinants of capital structure of banks in Africa thereby closing the gap in the literature. This study uses new estimation methodology by first of all determining the best method of estimating the panel regression model by examining fixed and random effects. This study originates new formula by controlling for macroeconomic

variables as determinants of capital structure of banks. This study is one of very few studies which have investigated the determinants of capital structure of banks in Sub-Sahara Africa. This study contributes by determining the significant variables that determines banks capital structure in Africa.

1. INTRODUCTION

The growth of the banking sector in Africa is key to Africa's economic growth and development. One of the reasons the banking sector in Africa lack progress and development is in the area of their financing and capital structure. It is important for banks in Africa to be able to finance their operations if they are to provide businesses with capital and also create job opportunities. To get a better understanding of how banks in Africa finance their operations, it is important that we examine what determines their capital structure. Recent developments in the global economy coupled with the financial crisis and credit crunch in the last decade has made researchers developed further interests in studying the banking sector. Furthermore, due to the increasing spate of globalization, the effect of these incidents have trickled down into the African banking sector hence banks in Africa have been influenced by the changing nature of banking services worldwide (Rehman and Ahmed, 2008). Irrespective of such developments, banks are graded on the basis of their profitability, branch network and customer service. The main function of banks is to accumulate surplus funds and make them available to deficit sectors of the economy.

However, competition in the banking sector has increase due to technological advancement and major changes in the financial and monetary environment of banks (Spathis *et al.*, 2002). Capital structure refers to the firm's financing mix mainly debt and equity used to finance the firm's operations. The ability of banks to carry out their stakeholders' needs is closely related to their capital structure. Since the seminal work of Modigliani and Miller (1963), capital structure studies have become an important subject matter in corporate finance theory. How a firm is been finance is of great importance to both the managers of the firm and the providers of capital. This is due to the fact that, a wrong mix of equity and debt financing employed can affect the performance and survival of the firm. This paper seeks to answer the question of what determines the capital structure of banks in Sub-Sahara Africa. Most empirical studies that analyze the determinants of capital structure have been done for individual countries, thus limiting the generalization and ability of the results of such studies. The purpose of this paper is to fill the gap in the literature relating to capital structure determinants of banks in Sub-Saharan Africa.

1.1. Main Research Hypothesis

Based on the research question of what determines capital structure of banks in Sub-Sahara Africa, the following hypothesis will be examine.

H_o: there is a positive relationship between debt ratio (DR) and firm's profitability in time t

H_1: there is a positive relationship between debt ratio (DR) and firm size in time t.

H_2: there is a positive relationship between Debt Ratio (DR) and asset tangibility in time t

H_4: *There is a positive relationship between debt ratio (DR) and firm's growth in time t.*

H_5: *There is a positive relationship between debt ratio (DR) and firm's corporate tax rate in time t.*

The rest of the paper is organized as follows: Section 1 provides a general overview of the research work and discussed the objectives of the study. Section 2 reviews the major literature on capital structure theories and determinants. Section 3 presents the methodology employed in the study. Section 4 presents and discusses the empirical results of the study. Section 5 summarizes major findings of the research, policy recommendations and conclusions.

2. LITERATURE REVIEW

2.1. Empirical Literature Review

Many studies have developed theoretical frameworks and conducted empirical tests to explain how firms chose between debt and equity and their relative proportion in firm financing (Baker and Wurgler, 2007), (Meier and Tarhan, 2007), and Dittman and Thakor (2007). Others like Guedes and Opler (1996) analyse debt issues from the perspective of agency theory and costs stemming from moral hazard problems. The point is that debt, arguably, can resolve agency problems between the shareholders and bondholders on one hand, and shareholders and managers on the other hand (Jensen and Meckling, 1976). Managers are believed to have no option other than being efficient where their organizations are significantly leveraged. This implies that firms leverage level can serve as a tool to monitor managerial behaviour. Moreover, the use debt financing is important because it does not dilute shareholders voting right even though the use of debt financing has the potential of increasing the risk of financial distress. The use of debt financing minimizes the problem of adverse selection unlike equity financing (Meier and Tarhan, 2007).

2.2. Theoretical Literature Review on Capital Structure

There are theories that describe how capital structure of a firm is formed. These theories of capital structure are in turn discussed below:

2.3. Trade-Off Theory of Capital Structure

The trade-off theory of capital structure states that a firm's choice of its debt – equity ratio is a trade-off between its interest tax shields and the costs of financial distress. The trade-off theories suggest that firms in the same industry should have similar or identical debt ratios in order to maximize tax savings. The tax benefit among other factors makes the after-tax cost of debt lower and hence the weighted average cost of capital will also be lower. Grigham and Gapenski (1996) argue that an optimal capital structure can be obtained if there exist tax benefit which is equal to the bankruptcy cost. It can be concluded that, there is an optimal capital structure where the weighted average cost of capital is at its minimum.

However, as a firm leverage ratio rises, bankruptcy cost will eventually offset increases in tax benefits. The trade-off theory sought to establish an optimal capital structure where the weighted

average cost of capital will be minimized and the firm value maximized. At the optimal level of capital structure, tax benefit will be equal to bankruptcy costs.

Modigliani and Merton (1958) argue that, the value of a firm is independent of its capital structure in a world without tax. However, this preposition was later modified to include corporate tax as against the previous preposition which they assume a world without tax. Modigliani and Miller argue that, in a world with taxes, the value of a firm can increase with increasing debt ratio since debt is interest tax deductible. As the leverage ratio of a firm rises, weighted average cost of capital declines and this will increase the present value of future cash flows. If the debt ratio increases beyond the optimal level, bankruptcy cost will overweighs the tax benefit and firms will no longer be benefiting from debt financing and hence the value of the firm will begin to decline. According to Leland Hayne (1994), a standard trade –off model of optimal capital structure is where marginal bankruptcy costs associated with a firm's debt are equal to the firm marginal tax benefit. An extension of Modigliani and Miller theory is studies conducted by Robichek and Myers (1965). Robichek and Myers (1965) argue that, the negative effect of bankruptcy costs on debt prevents firms from having the desire for more debt financing.

Scott (1977) argues that a firm's optimal debt ratio is determined by a trade-off between the bankruptcy cost and tax advantage of borrowing. He argues that, a firms bankruptcy cost is determined by the type of assets it has. For instance, if a firm invests heavily on land, equipment and other tangible assets, it will have smaller financial distress than a firm that relies on intangible assets. But smaller firms are seen as been more risky than larger firms because they do not have tangible assets (Berryman, 1982).

Grigham and Gapenski (1996), suggest that managers of a firm should be able to identify where the optimal capital structure is attained and try to maintain it at that level. This is the point where the weighted average cost of capital is minimized thereby increasing firm value and performance.

2.4. Agency Theory of Capital Structure

The agency cost theory of capital structure emanates from the principal-agent relationship Jensen and Meckling (1976). In order to moderate managerial behavior, debt financing can be used to mediate the conflict of interest which exists between shareholders and managers one hand and also between shareholder and bondholders on the other hand. The conflict of interest is mediated because managers get debt discipline which will cause them to align their goals to shareholders goals. Jensen and Meckling (1976) argue that, managers do not always pursue shareholders interest. To mitigate this problem, the leverage ratio should increase (Pinegar and Wilbricht, 1989). This will force the managers to invest in profitable ventures that will be of benefit to the shareholders. If they decide to invest in non-profitable businesses or investment and are not able to pay interest on debt, then the bondholders will file for bankruptcy and they will lose their jobs. The contribution of the Agency cost theory is that, leverage firms are better for shareholders as debt can be used to monitor managerial behavior (Boodhoo, 2009). Thus, higher leverage is expected to

lower agency cost, reduce managerial inefficiency and thereby enhancing firm and managerial performance (Aghion *et al.*, 1999). The main responsibility of managers is to manage the firm in such a way that it will yield returns to shareholders. But most of the time manager do not seek to maximize shareholders wealth but rather seek to maximize managerial utility.

2.5. Pecking Order Theory of Capital Structure

From the foregoing analysis, the focus on the use of debt has been on only the economic gains and benefits of obtaining optimal capital structure. According to the pecking order theory firms prefer financing their operations from internally generated funds, because the use of such funds does not send any negative signal that may lower the stock price of the firm. If external funds is required, firms prefer to issue debt first before considering the issue of equity. This pecking order occurs because issuing debt is less likely to send a negative signal to investors. If a firm issue equity it sends a negative signal to investors that the firm's share prices are overvalued that is why the managers are issuing equity. This will cause investor to sell their shares leading to a fall in the stock price of the firm. A share issue is thus interpreted by the market as bad news but debt is less likely to be interpreted this way. Firms therefore prefer to issue debt rather than equity if internal finance is insufficient. The primary aim of this theory is not to find the optimal capital structure but to describe how managers select and make use of the different sources of funds available to finance their operations. The pecking order theory of capital structure gives less weight to tax considerations and predicts that firms make financing choices according to the cash available to them and the degree of external financing constraints.

3. THEORETICAL FRAMEWORK AND METHODOLOGY

3.1. Capital Structure and Firm Characteristics

A number of firm-level characteristics have been identified in previous empirical studies examining capital structure determinants and these include; firm size, asset tangibility, profitability and growth. These are discussed in turn.

3.2. Debt Ratio (DR)

The dependent variable used in this study is Debt Ratio (DR). According to the agency cost theory of capital structure, high leverage is expected to reduce agency cost, reduce inefficiency and eventually leads to improvements in firm's performance. Berger (2000) argues that an increase in the leverage ratio should result in lower agency costs outside equity and improve firm's performance, all other things being equal. From the analysis above, there is an inverse relationship between leverage (DR) and firm performance.

3.3. Firm Size

The size of the firm is a very important determinant of its profitability that is why it is included as a controlled variable. Firm size has a positive relationship with short-term debt ratio (Abor,

2008). According to Penrose (1959), larger firms enjoys economies of scale and economies of scope and this has the tendency to impact its profitability. Larger firms can also increase their market power and this will have an impact on its profitability and performance. Larger firms can take on more debt or increase leverage since their profits are high enough to service their debt (Shepherd, 1989).

Larger firms benefit from diversification and hence their earnings are not volatile making them able to take on more debt or increase their leverage ratio (Castanias, 1983; Titman and Wessels, 1988; Wald, 1999). Young and smaller firms on the other hand cannot tolerate high debt ratios since they may not have stable earnings. Those who lend to large firms are more likely to be paid back their interest and principal than lenders to small firms thereby reducing the agency cost that is associated with debt and hence large firms can have higher debts.

Empirical evidence shows that there is a positive relationship between the size of a firm and its capital structure (see (Friend and Lang, 1988; Barclay and Smith Jr, 1996)). Their analysis indicates that smaller firms are likely to finance their operations by equity rather than debt.

3.4. Asset Tangibility

Asset tangibility is considered to be one of the most significant determinants of firm's performance. According to the literature there exist a positive relationship between asset tangibility and a firms debt ratio, that is, the more tangible assets the firms has, the more debt it can take. This is because if firms have more tangible assets which it can easily convert into cash, it can increase it debt ratio since it can service the debt through its tangible assets in the event of liquidation.

MacKie-Mason (1990) concluded that a firm that has more tangible assets in its asset base is likely to choice debt and this will affect the firm's performance. Firm that invest more of its retained earnings in tangible assets will have low bankruptcy cost and financial distress that firms that relies on intangible assets Akintoye (2008).

Based on the above argument, the relationship between asset tangibility and firm's performance is expected to be positive. It is believed that more debt will be used if firms have more tangible assets to serve as collateral. By using the firm's assets as collateral the cost associated with adverse selection and moral hazards are reduced. This will result into firms with greater asset liquidation value having more access to debt at low cost than firms that have intangible assets. It is also suggested that bank funding will depend on whether its lending can be secured by tangible assets (Storey, 1994; Berger and Udell, 1998).

Empirical evidence suggests that, there is positive relationship between asset tangibility and debt ratio of firms and this is consistent with theory (Friend and Lang, 1988; MacKie-Mason, 1990; Rajan and Zingales, 1995).

3.5. Profitability

Profitability is one of the most important determinants of the capital structure of banks in Africa. However, the return on asset (ROA) is used as a proxy for profitability in this paper. The

pecking order theory as discussed above explains the relationship between profitability and capital structure. The pecking order theory suggests that firms prefer internal financing than external financing. They prefer internal financing because it is cheaper than external financing. The internal financing is cheaper because there is no cost associated with using internal funds that is, there is no interest payment as it is in the case of debt as an external source of funds and no dividend payment as it is in the case with equity as an external source of financing. Base on the above argument, firms that are more profitable turn to have more retained earnings and will prefer to finance its operations from its retained earnings than issuing debt or equity and hence they turn to have lower debt ratio than firms that do not have retained earnings.

The pecking order theory of capital structure seems to suggest that there is a negative relationship between a firm's capital structure and profitability. According to Titman and Wessels (1988) and Barton *et al.* (1989), firms that have higher profit would maintain a low debt ratio since they are able to generate those funds internally "all other things being equal". Evidence from empirical studies seems to support the pecking order theory. Most studies have found a negative relationship between profitability and capital structure (see (Friend and Lang, 1988; Barton *et al.*, 1989)), Esperança *et al.* (2003) and Hall *et al.* (2004) also suggest a negative relationship.

3.6. Growth

When firms have high growth potential, most of the time, their retained earnings is not enough to finance their positive NPV projects and they resort to borrowing (Hall *et al.*, 2004). Firms with high growth potential will have high debt ratios. Empirical research done, relating capital structures and firm growth suggest a positive relationship between them (see (Kester, 1986; Titman and Wessels, 1988; Barton *et al.*, 1989)). Other researchers suggest that there exist a negative relationship between a firm growth in assets and its capital structure because high growth firms use less debt based on the Pecking order theory (see (Kim and Sorensen, 1986; Rajan and Zingales, 1995; Roden and Lewellen, 1995)). According to Michaelas *et al.* (1999) future growth is positively related to leverage ratio.

3.7. Taxation

Most of the empirical studies that examine the determinants of capital structure include taxation as a controlled variable. Some of these studies include MacKie-Mason (1990), Shum (1996) and Graham (1999). Makie-Mason studies in MacKie-Mason (1990) provide evidence of the external effect that marginal corporate tax as on corporate financing decision regarding equity and debt. They concluded that changes in the marginal tax rate of a firm should affect its financing decision. They established the fact that a firm with a high tax shield is less to finance with debt if the probability of facing a zero tax rate is high. The main reason is that tax shields lower the effective marginal tax rate on interest deductions.

Graham (1999) concluded that indeed tax rate do affect corporate financing decision and performance but the magnitude of the effect is mostly not significant. However, De Angelo and

Masulis (1980) show that there are other alternative tax shields such as depreciation, research and development expense that could be substituted for the fiscal role of debt.

3.8. External Factors

3.8.1. Macroeconomic Variables

Another group of variables that determines banks capital structure is macroeconomic variables. Three macroeconomic variables are controlled for in this study. They include interest rate on deposits, inflation rate and GDP growth rate. Previous studies indicate that there is a positive relationship between inflation rate and banks capital structure especially if the inflation rate is anticipated. If the inflation is anticipated, banks can adjust their lending rate and this will enhance their debt level. On the other hand if the inflation rate is unanticipated it can adversely affect banks capital structure. In inflation rates are generally associated with high interest rate on loans the banks give to their customers and therefore high interest incomes. According Perry (1992) the relationship between inflation rate and banks capital structure depends on whether the inflation is anticipated by a bank's management. Among studies that find a significant positive relationship between inflation rate and bank capital structure are those conducted by Molyneux and Thornton (1992) and Bourke (1989). GDP growth rate is expected to have a positive effect banks capital structure. It is expected that if the GDP growth rate increase, banks performance will also increase and this will cause them to borrow less according to the pecking order theory.

Another macroeconomic variable that influence banks capital structure is the interest rate on debts. As interest rate increase, banks cost of borrowing will be very high and this will reduce their investment (Bartholdy and Mateus, 2008).

3.9. Research Methodology

An unbalanced panel regression model will be used for the estimation in this study. This is because the data used in this study involves both cross-sectional data and time series and the number of banks selected in each country is not the same. Bank data was collected from thirty seven (37) African countries from price Water House Coopers. The use of panel data is advantageous because of the several data points, the degrees of freedom are increased and collinearity among the explanatory variables is reduced thereby increasing the economic efficiency and the predictive power of the model.

3.10. Model Specification

The dependent variables used in this study are the short-term debt ratio (STDR) which is defined as the ratio of short-term debt divided by the total capital, long-term debt ratio (LTDR) which is also defined as the ratio of long-term debt divided by the total capital, and the total debt ratio (TDR) which is defined as the ratio of total debt divided by the total capital. The explanatory variables include, size, asset tangibility, profitability, growth, marginal corporate tax, GDP growth rate, interest rates and inflation rates. The debt ratios are regressed against the eight explanatory

variables. The panel regression equation differs from a regular time-series or cross sectional regression by the double subscript attached to each variable. The panel data model is specified as:

$$Y_{it} = \beta_0 + \beta \sum X_{it} + e_{it}$$

With the subscript (i) denoting the cross-sectional dimension and t representing the time series dimension. The left hand-side variable represent the dependent variable in the model which is the banks debt ratio, X_{it} represents the independent variables in the estimation model, β_i is the constant overtime t and specific to the individual cross-sectional unit i. The model for estimating the determinants of capital structure base on the variables discussed is specified as;

3.10.1. Model

$$STDR_{it} = \beta_0 + \beta_1 ROA_{it} + \beta_2 SIZE_{it} + \beta_3 TANG_{it} + \beta_4 GROWTH_{it} + \beta_5 TAX_{it} + \beta_6 GDPGR_{it} + \beta_7 INTEREST_{it} + \beta_8 INFLR_{it} + e_{it} \text{----------- (1)}$$

$$LTDR_{it} = \beta_0 + \beta_1 ROA_{it} + \beta_2 SIZE_{it} + \beta_3 TANG_{it} + \beta_4 GROWTH_{it} + \beta_5 TAX_{it} + \beta_6 GDPGR_{it} + \beta_7 INTEREST_{it} + \beta_8 INFLR_{it} + e_{it} \text{----------- (2)}$$

$$TDR_{it} = \beta_0 + \beta_1 ROA_{it} + \beta_2 SIZE_{it} + \beta_3 TANG_{it} + \beta_4 GROWTH_{it} + \beta_5 TAX_{it} + \beta_6 GDPGR_{it} + \beta_7 INTEREST_{it} + \beta_8 INFLR_{it} + e_{it} \text{----------- (3)}$$

3.11. Data Type and Sources

A long panel data on banks from 37 countries in the Sub-Saharan region from the period 2000 to 2006 will be used. The data is a secondary data obtained from the Price Water House Coopers Annual Banking survey. For inclusion in the sample was a seven (7) year data ranging from 2000-2006 resulting in a panel database. The criteria used for selecting the banks in each country was based on the availability and quality of data for the time period from 2000-2006. Some of the banks are public whiles others are private.

3.12. Variable Definition and Measurement

$TDR_{it} = leverage\ (Total\ debt/equity + debt)\ for\ firm\ i\ in\ time\ t.$

$STDR_{it} = (Short-term\ debt/equity + debt)\ for\ firm\ i\ in\ time\ t.$

$LTDR_{it} = (Long-term\ debt/equity + debt)\ for\ firm\ i\ in\ time\ t.$

$TANG_{it} = fixed\ tangible\ assets\ divided\ by\ total\ assets\ for\ firm\ i\ in\ time\ t$

$SIZE = the\ size\ of\ the\ firm\ (natural\ log\ of\ total\ assets)\ for\ firm\ i\ in\ time\ t'$

$GROWTH_{it} = growth\ rate\ of\ total\ assets\ for\ firm\ i\ in\ time\ t$

$e_{it} = $ the error term. the error term takes care of other explanatory variables that

equally determines capital structure but are not included in the model

TDR=Debt ratio STDR=short-term debt ratio LTDR=long-term debt ratio TANG= asset tangibility SIZE=Size of the bank GROWTH= growth rate of total assets TAX=corporate marginal tax rate GDPGR=GDP growth rate INTEREST= interest on loans INFLR= inflation rate

4. RESULTS AND DISCUSSION

4.1. Unit Roots Test

The study employed STATA 11.2 package to carry out two panel unit root test (Levin-Lin-Chu and Im-pesaran-shin) in order to determine whether the variables used were stationary. The variables used were all stationary at levels and hence they are integrated of order zero (0) stochastic process.

4.2. Fixed and Random Effect Models

This study employs samples of banks in Sub-Sahara Africa across 37 (thirty-seven) countries, hence the tendency for the fixed effect and random effect models estimates to differ from each other significantly. Hausman chi-square test was conducted in each equation and the results show that the Hausman test is significant at 5% level in all the equations used in the study. This implies that the two estimates differ significantly and hence the fixed effect is preferable to the random effect estimate. However the results of the OLS estimates (although not reported here) do not differ significantly from the fixed effect estimates, hence the conclusions of the study are based on the results of the fixed effect estimates. The results of the Hausman test are reported in each regression table. The fixed effects model is used in this study because, if there are omitted variables, and these variables are correlated with the variables in the model, then fixed effects models may provide a means for controlling for omitted variable bias. In a fixed-effects model, subjects serve as their own controls. The idea is that whatever effects the omitted variables have on the subject at one time, they will also have the same effect at a later time; hence their effects will be constant, or "fixed." However, in order for this to be true, the omitted variables must have time-invariant values with time-invariant effects. By time-invariant values, we mean that the value of the variable does not change across time. By time-invariant effects, we mean the variable has the same effect across time. Random effects models will estimate the effects of time-invariant variables, but the estimates may be biased because we are not controlling for omitted variables. Random effects models will often have smaller standard errors. But, the trade-off is that their coefficients are more likely to be biased.

Fixed effects models control for or partial out the effects of time-invariant variables with time-invariant effects. This is true whether the variable is explicitly measured or not.The fixed effect model removes the effects of time- invariant characteristics from predictor variables so that we can assess the predictor's net effect (Oscar Torres-Reyna, 2001)

4.3. Descriptive Statistics

Table 1 below shows the descriptive statistic of all the variables used in the study. The mean of the ROA of the sample banks is 2.61. The results indicates that on the average, for every dollar worth of total assets of the banks, 2.61 was earned as profit after tax.. The analysis showed that the selected banks have high performance ratios except that of the net interest margin. The mean total debt ratio is 0.8728, and the mean size of banks is 8.77. The mean of tangible assets is 0.0421, this

means that the proportion of the firms fixed asset to total asset is about 4.2%. Growth rate of the banks on the average is 0.1299, average tax rate is 29.53, and the mean GDP growth rate of African countries is 4.70% which is significant. The mean interest rate on loans and inflation rate is 9.80% and 16.2% respectively

Table-1. Descriptive Statistics of Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
STDR	1050	.7476392	.163638	.0433927	.9620232
LTDR	1050	.125159	.1354834	0	.9285166
TDR	1050	.8727982	.0983089	.1172168	1.407162
ROA	1050	2.610419	4.158988	-56.7	49.64
SIZE	1050	8.772074	2.909463	-.1053605	14.34947
TANG	1050	.0421366	.0337035	.0000813	.3292056
GROWTH	1049	.1298808	48.40119	-1462.071	237.3132
TAX	1050	29.5301	4.777408	20	40
INTEREST	1050	9.797602	12.70141	.8541667	203.375
GDPGR	1050	4.70265	3.880106	-16.99508	27.46172
INFLR	1050	16.21115	60.97024	9.616154	1096.678

TDR=Debt ratio STDR=short-term debt ratioLTDR=long-term debt ratioEQUM=equity multiplierTANG= asset tangibilitySIZE=Size of the bank GROWTH= growth rate of total assetsROA=return on assetROE=return on equityNIM=net interest marginTAX=corporate marginal tax rateGDPGR=GDP growth rate INTEREST= interest on loansINFLR= inflation rate

4.4. Correlation Analysis

Due to the problem of multicollinearity among variables, a correlation matrix of the variables used in the regression is presented in table 2. The interest rate and the inflation rate are highly correlated about 80% and the same applies to the short-term debt and long-term debt ratios. However , the correlation figures among the other variables are statistically insignificant and hence there is no multicollinearity problem.

Table-2. Correlation Matrix of all variables used in the study

	Stdr	ltdr	trd	roa	size	tang	growth	tax	interest	gdpgr
Stdr	1.0000									
ltdr	-0.8002	1.0000								
trd	0.5625	0.0458	1.0000							
roa	-0.1461	-0.0160	-0.2653	1.0000						
size	0.2660	-0.2089	0.1550	-0.1036	1.0000					
tang	-0.1795	0.1094	-0.1482	-0.0718	0.0699	1.0000				
growth	0.0097	-0.0122	-0.0007	0.0486	0.1022	-0.0176	1.0000			
tax	-0.1005	0.1414	0.0276	0.0380	-0.0015	0.1863	-0.0093	1.0000		
interest	-0. 1257	0.1089	-0.0592	0.3538	-0.2472	0.1520	-0.0273	0.1654	1.0000	
gdpgr	-0.0473	0.0538	-0.0047	0.0085	0.0233	0.0311	-0.0074	0.0749	-0.1744	1.0000
inflr	-0.0642	0.0353	-0.0582	0.2932	-0.0637	0.1756	0.0419	0.0979	0.8034	-0.2235
inflr										
	inflr									
	Inflr	1.0000								

TDR=Debt ratio STDR=short-term debt ratio LTDR=long-term debt TANG=asset tangibility SIZE=Size of the bank GROWTH= growth rate of total assets ROA=return on asset TAX=corporate marginal tax rate GDPGR=GDP growth rate INTEREST= interest on loans INFLR= inflation rate

4.5. Regression Results and Discussion

4.5.1. The Determinants of Capital Structure of banks in Sub-Sahara Africa

The regression results of the determinants of capital structure are presented in table 4. The return on asset (ROA) is statistically significant at 5% in determining the short-term debt ratio,

10% statistically significant in determining the long-term debt ratio and also significant in determining the total debt ratio at 1%. The coefficients of the return on asset (ROA) on the debt ratios are negative which is consistent with the pecking order theory which suggests a negative relationship. It indicates that banks that are more profitable rely on their retained earnings and use less debt.

According to the pecking order theory, profitable firms use less debt because they have more retained earnings (Friend and Lang, 1988; Barton *et al.*, 1989). The size of the bank is statistically significant in determining the total debt ratio at 10% and it also carries the expected sign which is consistent with theory which suggest that, the larger the size of the bank, the higher the debt ratio because larger firms have stable earnings and can afford higher debt ratios (Castanias, 1983; Titman and Wessels, 1988; Wald, 1999). Asset tangibility (tang) is only statistically significant at 1% and has a negative coefficient in determining the total debt ratio but theoretical argument supports a positive relationship but it is not statistically significant in determining the short-term and long-term debt ratios (MacKie-Mason, 1990). However, asset tangibility is not significant in determining short-term and long term debt ratios. The growth rate of banks is statistically significant in determining short-term debt ratio at 5% level and 10% in determining the long-term debt ratio but has a positive coefficient in determining the short-term debt ratio and negative coefficient in determining the long-term debt ratio which is consistent with theory Michaelas *et al.* (1999), but it is not statistically significant in determining long-term debt ratio and total debt ratio. Tax is also not statistically significant in determining debt ratios of banks in Sub-Sahara Africa.

The study also controlled for macroeconomic variable such as the GDP growth rate, the interest rate and inflation rate. The GDP growth rate is not statistically significant in determining debt ratios of banks in Africa but it carries the expected signs which are positive in the short-term debt ratio (STDR) and the total debt ratio (TDR) indicating that as the economy grows banks profitability will also increase. Interest rate is not also statistically significant in determining debt ratios of banks in Africa. Inflation rate is not also statistically significant in determining the short-term debt ratio and long-term debt ratio but it is statistically significant at 10% level in determining the total debt ratio of banks in Sub-Sahara Africa which is consistent with theory, especially if the inflation is unanticipated Molyneux and Thornton (1992) and Bourke (1989)

Table-4. The table shows the regression results of th t statistics in parentheses(bracket)

	(1) STDR	LTDR(2)	(3)TDR
ROA	-0.00228** (-3.00)	-0.00204* (-1.86)	-0.00432*** (-4.10
SIZE	0.000272 (0.03)	0.00795 (0.98)	0.00822* (1.93)
TANG	-0.409 (-1.53)	0.0304 (0.14)	-0.379*** (-3.19)
GROWTH	0.0000733** (2.65)	-0.0000818* (-1.87)	-0.00000859 (-0.33)
TAX	-0.00205 (-1.09)	0.000506 (0.26)	-0.00155 (-1.36)

GDPGR	0.000694 (0.81)	-0.000668 (-0.88)	0.0000260 (0.04)
INTEREST	-0.000727 (-0.99)	0.000775 (1.08)	0.0000476 (0.14)
INFLR	0.0000272 (0.19)	-0.000141 (-1.08)	-0.000114* (-2.21)
			Continue
_CONS	0.832*** (8.74)	0.0423 (0.43)	0.875*** 16.40)
N	1049	1049	1049
R-sq	0.039	0.017	0.117
adj. R-sq	0.032	0.010	0.110
Hausman Test: Random vs Fixed effects			
Chi-square	18.38	57.41	35.50
P-values	0.104	0.0000	0.0000

* p<0.10, ** p<0.05, *** p<0.01
TDR=Debt ratio STDR=short-term debt ratioLTDR=long-term debt ratioTANG= asset tangibilitySIZE=Size of the bank GROWTH= growth rate of total assetsROA=return on assetTAX=corporate marginal tax rateGDPGR=GDP growth rate INTEREST= interest on loansINFLR= inflation rate

5. SUMMARY, CONCLUSION AND POLICY IMPLICATIONS

5.1. Summary and Conclusions of Study

This paper examines the determinants of capital structure of banks in Sub-Sahara Africa; eight variables were selected as the determinants of capital structure of banks in Sub-Sahara Africa which include return on asset, size of a bank, asset tangibility, growth rate of banks, taxes, GDP growth rate, interest rates and inflation rate.

Due to the problem of heteroskedasticity, autocorrelation and multicollinearity in the panels, the study employed cluster robust standard errors to estimate the parameters. Hausman test was conducted and the results show that fixed effect model is more appropriate since the p-values of the Hausman chi-square are statistically significant.

The results show that, the return on asset of banks significantly determines the total debt ratio (TDR), the short-term debt ratio (STDR) and the long-term debt ratio (LTDR) and this confirms the pecking order theory. The relationship between debt ratios and return on asset which is a measure of profitability is negative indicating that, when banks performance well they would have a lot of retained earnings and will therefore depend less on debt since they can rely on their retained earnings to finance their operations and this confirms the pecking order theory which is contrary to the agency cost theory and static trade-off theory of capital structure. Banks in Sub-Sahara Africa prefer internal financing because the use of such funds does not send any negative signal that may lower their stock prices. If external finance is required, firms prefer to issue debt first before issuing equity. This pecking order occurs because debt issue is less likely to send a negative signal.

The primary aim is the description of how managers select and make use of the different sources of funds to finance their operations. This makes pecking order more meaningful to existing banks. The pecking order theory of capital structure on its part gives less weight to tax considerations and predicts that companies make financing choices according to the cash available

to them and the degree of external financing constraints. This in conclusion, is to say that banks in Sub-Sahara Africa follow the pecking order theory.

Size is also statistically significant in determining banks capital structure (total debt ratio) in Africa and this confirms theoretical literature according to Penrose (1959). Larger firms can take on more debt or increase leverage since they have stable earnings and higher profit enough to service their debt according to Shepherd (1989).

The results also show that asset tangibility is significant in determining banks capital structure. MacKie-Mason (1990), conclude that a firm that has more tangible assets in its asset base is likely to choice debt and this will affect the firms performance. Growth rate of banks is significant in determining banks short-term debt ratio and long-term debt ratio. Firms with high growth potential will have high debt ratios. Empirical research done, relating capital structures and firm growth suggest a positive relationship between them (see (Kester, 1986; Titman and Wessels, 1988; Barton *et al.*, 1989)). However, taxes interest rates and GDP growth rate do not affect banks capital structure in sub-Sahara Africa. Inflation rate is however significant in determining total debt ratio.

From the foregoing analysis, it can be concluded that, capital structure of banks in Sub-Sahara Africa is determined by their return on asset (ROA) which is a measure of their performance, asset tangibility, their growth rate and inflation rate.

5.2. Policy Implications of the Study

Since return on asset (ROA) is statistically significant and negatively impact short-term debt ratio, the long-term debt and the total debt ratio, the management of banks in Africa should be concerned with putting measures in place to enhance their return on assets (ROA). If banks should put measures in place to increase and enhance their return on asset (ROA), it will reduce their debt ratios. A reduction in banks debt ratios will enable them avoid some of the negative tendencies that is associated with increasing financial leverage such as bankruptcy cost and financial distress. Banks should also have more tangible assets which they can use generate more profit in order to reduce their debt ratios since tangible asset is significant in determining their total debt ratio. Banks should also growth their assets since asset growth reduces their long-term debt ratio significantly.

The government and monetary authorizes should put policies in place to curb inflation in order to avoid unanticipated inflation, since unanticipated inflation reduces banks debt ratios because the cost of borrowing will be very high.

5.3. Limitations of the Study

The major limitation of the study is in relation to the use of a less than current data for the analysis. The data on banks' capital structure and performance variables was gathered from 2000 to 2006; thus, more current years are not considered; this may affect the extent of applicability of findings as the phenomenon under study may have changed over the last few years. The reason for the inability of this study to use current data is that, most of the banks analyzed in this study do not have data up to date and this may be due to the fact that, most of the banks might have undergone

mergers and acquisition due the Basel II capital adequacy requirements that might have forced most of the banks to merge. Further research can be done to include more recent data to cover the global financial crisis period which this study could not cover.

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