

## DETERMINANTS OF CORPORATE CAPITAL STRUCTURE IN NIGERIA

OGBULU, Onyemachi Maxwell. (Ph.D)<sup>1</sup> and EMENI, Francis Kehinde (ACA)<sup>2</sup>

<sup>1</sup> Dept of Banking And Finance, Abia State University, Uturu, Nigeria.

E-mail: [hrhogbulu@yahoo.com](mailto:hrhogbulu@yahoo.com)

<sup>2</sup> Faculty of Management Sciences, University of Benin, Benin City, Nigeria.

E-mail: [fkemeni@yahoo.ca](mailto:fkemeni@yahoo.ca)

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### ABSTRACT

*In the finance literature, there has been growing interest in what determines the capital structure of firms. The existing literature is concerned with the determinants of capital structure in more developed economies. This paper aims to extend this literature by ascertaining the determinants of capital structure in an emerging economy like Nigeria. In this paper, it is hypothesized that there is no relationship between gearing (CAPSTR) and the size, growth, profitability, tangibility and age of a firm. Using a cross-sectional survey data from 110 firms listed on the Nigerian stock exchange and analysis of data by the OLS method, it was found that size has a positive and significant impact on capital structure while age has a negative and significant influence. Tangibility (TANG), growth of a firm (GROWTH) and profitability (PROF), on the other hand, do not have any significant impact on the capital structure of firms in Nigeria. Based on this finding, some recommendations were made; prominent amongst which was that, directors of companies in Nigeria should pay more attention to two key CAPSTR indicators (size and age) when taking financing decisions.*

**Keywords:** Fund Performance, Fund Size, Risk, Expense Ratio, Turnover Ratio, Fund Age

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### INTRODUCTION

A theme of one on going debate in the world of corporate finance is what determines a firm's capital structure. Despite significant contributions, research produced so far did not yet provide a sound basis for establishing the empirical validity of different theoretical models. Probably the most eclectic, prevalent and non controversial view with respect to the contention surrounding corporate capital structure theory is Myer's (1993) argument that it is a PUZZLE, and mirrored by Stiglitz and Weiss (1981) as a DILEMMA.

According to Rajan and Zingales (1995) and Harris and Raviv (1991), more research on capital structure hypothesis is needed to increase the robustness of its determinants. In spite of extensive research, Myers' (1984) classic question "how do firms choose their capital structure?" remains unanswered. Also Altman and Subrahmanyam (1985) saw the factors likely to determine corporate capital structure as both extensive and indeterminate. Two landmark contributions: the corporate tax equilibrium models developed by Modigliani and Miller (1963) and the synthesis of personal and corporate tax effect by Miller (1977) represent extremes in the sense that they are equilibrium models built on sets of fairly restrictive assumptions.

Also, their implications represents two opposing "corner solutions" of either gains of increased resort to debt via the corporate tax shields on interest payments, or zero gains in inappropriate circumstances where the personal tax rates on debt and equity are of the relative magnitude required to vitiate any corporate gains from tax shields on interest payments. In between these extremes are numerous papers which suggest that determining an appropriate capital structure might involve a trade-off between positive tax subsidies associated with issuing debts and the various costs which are likely to be associated in an imperfect world with higher leverage (De Angelo and Masulis, 1980; and Modigliani, 1982). This trade-off theory postulates that an appropriate capital structure involves balancing the corporate tax advantages of debt financing against the costs of financial distress that arise from bankruptcy risks (Kraus and Litzenberger, 1982) and agency costs (Jensen and Meckling, 1976). The empirical support for this theory, however, is far from conclusive. For instance, Bradley, Jarrel and Kim

(1984) find no clear evidence.. The inclusion of personal taxation (Miller, 1977) and non-debt tax shields (DeAngelo and Masulis, 1980) has made the debate even more complex. Later, in the early 1980s theories based on asymmetric information joined the debate (Myers, 1984).

In a quest for the factors that managers consider in deciding the capital structure of a firm, many studies have examined the role of several firm-specific factors. In a review article, Harris and Raviv (1991) report that leverage is positively related to non-debt tax shields, firm size, asset tangibility, and investment growth opportunities, while it is inversely related to bankruptcy risk, research and development expenditure, advertising expenditure, and firm's uniqueness. In general, major studies so far have analyzed the role of firm-specific factors that represent taxation, agency costs and information asymmetries.

Also, in a cross-sectional analysis of the determinants of corporate capital structure of companies in the G-7 economies, Rajan and Zingales (1995) expanded the view of Harris and Raviv (1991) by identifying that leverage is positively related to Growth, Size and Tangibility but negatively related to profitability. Bevan and Danbolt (1999) researched this work in 1999 and complemented the work of Rajan and Zingales (1995). In this study, we intend to add to these studies by analyzing the determinants of corporate capital structure in the Federal Republic of Nigeria. The variables of interest (capital structure, size, growth, profitability, tangibility, and age) are defined as follows. Capital structure means the addition of long-term debt and shareholders' fund. Tangibility is the percentage of fixed tangible assets to total assets (fixed assets plus current assets). Profitability is the percentage of profit before tax to total assets. Age is the age of the firm arrived at by finding the difference between the date this study was conducted and the firm's incorporation date. Size is the turnover (for other companies) or gross income (for Banks) or gross premium (in case of insurance companies) and growth means the percentage change in turnover/gross income or gross premium for a number of years.

## LITERATURE REVIEW

The theoretical literature on the factors that are likely to determine corporate capital structure is both extensive and indeterminate (Altman and Subrahmanyam, 1985). Two landmark contributions are the corporate tax equilibrium model and the synthesis of personal and corporate tax offsets by Miller (1977). These 2 papers have represented extremes, in the sense that they are equilibrium models built on sets of fairly restrictive assumptions and their implications represents 2 opposing 'corner solutions' of either gains from increased resort to debt via the corporate tax shield on interest payment or zero gains in inappropriate circumstances, where the personal tax rate on debts and equity are of the relative magnitudes required to vitiate any corporate gains from tax shields on interest payment. In between these 2 extremes are numerous papers, which suggest that an optimum capital structure might involve a trade-off between positive tax subsidies associated with issuing debts and the various cost likely to be associated in an imperfect world with higher leverage (De Angelo and Masulis, 1980; and Modigliani, 1982).

One of the more notable recent contributions in this area is a paper by Bradley, Jarrel and Kim (1984) which has the dual merits of; first, constructing a comparative single static model of a company's capital structure determinants, which captures tax advantage and bankruptcy costs trade-off along the lines suggested by Kraus and Litzenberger (1982) and the agency cost of debt argument of Jensen and Meckling (1976). It was further argued that, it also reflects the potential loss of non-debt tax shields in states of non default as suggested by De Angelo and Masulis (1980), and the previously mentioned work on personal and corporate tax rates by Miller (1977), and extensions of this by Kim (1978) and Modigliani (1982). Secondly, it features an attempt to verify empirically, the models predictions via a cross-sectional regression analysis of data relating to 851 American corporations over the period 1962-1981.

A theoretical consideration of the previously mentioned literature suggests a number of factors which are likely to have an impact on a company's capital structure decision. Modigliani and Miller (1963) argue that due to the tax deductibility of interest payments, companies may prefer debt to equity. This would suggest that highly profitable firms would choose to have high level of debts in order to obtain attractive tax shields. However, others such as Miller (1977) highlighted the limitations of his and Modigliani's 1963 arguments, by additionally considering the effects of personal taxation. If Millers 1977 approach is adopted, then disparities in the personal tax treatment of returns from equity to debt could 'wash out' any corporate tax advantages of tax shield on interest payments. There is a large literature linking increased leverage with increased probability of incurring bankruptcy costs, but the evidence on the scale of bankruptcy cost is meager (Warner, 1977). This has led many to suggest an inverse relationship between riskiness (variously defined) and corporate debt levels, a theme echoed by Bradley, Jarrel and Kim (1984). Furthermore, interest tax shields are not the only methods of reducing corporate tax burdens. Indeed there are various non debt tax shields, such as accelerated depreciation and investment tax credits which De Angelo and Masulis (1980), amongst others, have suggested can act as

substitutes for the former. Thus, other things being equal, we might expect an inverse relationship between company debt levels and the availability of non-debt tax shield.

A further dimension to the issue is provided by the agency literature. This suggests that the various agency cost associated with increased resort to debt issues in the form of restrictive bond covenants for example, mean that after a certain point, issuing further debt becomes counter productive (Jensen and Meckling, 1976). The difficulties lie in defining the type of company that is particularly likely to encounter heavy agency costs. Jensen and Meckling (1976) defined the issue in terms of ownership structure and management participation in this, but more recently, Myers (1977) and Myers and Majluf (1984) have extended the issue to include the value of the assets in place vis-à-vis intangible assets and value tied up in 'option to invest'. Thus, other things being equal, it might be expected that a company with large expenditure on research and development, or advertising or both would have a greater portion of its value made up in intangible forms and, therefore to incur higher agency costs in a debt issue than a company whose value is predominantly made up of tangible assets.

Work on asymmetric information (again by Myers and Majluf, 1984) suggests that companies may have a pecking order and prefer internal finance, then debt, and finally equity. Bradley, Jarrel and Kim (1984) made no elicited reference in their study to the likely impact of increased profitability and debt ratios, yet work by Kester (1986) in a cross-sectional study of debt ratios in the USA and Japan indicates that profitability has a negative influence on debt ratios. The authors therefore decided to include a variable to proxy for this.

Furthermore, empirical work by Kester (1986) suggests that profitability is likely to be a major determining factor. Kester's work also features Growth variable which obviously could not be incorporated in Bradley, Jarrel and Kim's (1984) one-period model. The authors decided to include such a variable and a further one to represent the dividend payout ratio. This was because the 'Me-first' and the agency literature suggests that a large dividend payout can reduce the security of the bondholders and in practice, debt covenant of many western corporations explicitly set limits on the freedom of the companies to increase their ratios beyond certain limits (Smith and Warner, 1979). The hypothesis would be that, debt ratios would be negatively related to dividend payout ratios and positively related to growth since growth as measured by asset value would enhance the company's ability to borrow further.

Rajan and Zingales (1995) examine the extent to which, at the level of the individual firm, capital structure determinants may be explained by four key factors, namely, the level of growth opportunities, profitability, and tangibility. In this study, the intension is to extend their analysis to large firms operating in Nigeria, in a cross-sectional analysis; taking into consideration the key likely determinants – firm size, growth opportunities, profitability, tangibility and age.

#### **Capital structure and company size**

Rajan and Zingales (1995: 1451) opines that, "the effect of size on leverage is more ambiguous. Larger firms tend to be more diversified and fail less often, so size (net sales) may be an inverse proxy for the probability of bankruptcy in developed countries". In addition, larger companies are more likely to have a credit rating and thus have access to non-bank debt financing, which is usually unavailable to smaller companies (Bevan and Danbolt, 1999). The principal-agency controversy between equity holders and lenders make credit rating of small companies very low, thereby making lenders to shorten the length of maturity for loans to small companies. However, the empirical evidence is inconclusive; Barclay, Smith and Watts (1995) find a positive relationship between size and gearing. Stohs and Mauer (1996) find no size effect. Therefore in this study, it is hypothesized that:

*There is no positive relationship between gearing (CAPSTR) and company size.*

#### **Capital Structure and Growth Options**

According to Bevan and Danbolt (1999), the market-to-book ratio is used by Rajan and Zingales (1995) as a proxy for the level of growth opportunities available to the company. This is in common with most studies which tend to apply proxies, rather than valuation models to estimate growth opportunities. Myers (1977) argues that, due to information asymmetries, companies with high gearing would have a tendency to pass up positive net present value investment opportunities. Myers therefore argued that companies with large amounts of investment opportunities (also known as growth options) would tend to have low gearing ratios. However, as discussed by Myers (1977), Barnea, Haugen, and Senbet (1980), Stohs and Mauer (1996), and Michaelas, Chittenden and Poutziouris (1999), the relationship between growth opportunities and capital structure may be different for short and long-term forms of debt. Therefore, it is hypothesized that:

*There is no positive relationship between gearing (CAPSTR) and a company's growth options.*

### Capital Structure and Profitability

As earlier stated the pecking order theory of capital structure implies that, most profitable firms use source of internal funding and low profitable firms use debt financing due to insufficient internal funds. Unlike MM's theory, POT weighted less to tax shield in capital structure. Profitable firms with limited investment opportunities work down to low debt ratios. Bevan and Danbolt (1999) in their study on 'dynamics in the determinants of capital structure in the UK' tend to support the POT; they found that profitable firms are less geared. This appears to be driven by a monotonic positive shift in the correlation between profitability and short term bank debt.

Modigliani and Miller (1963) argue that, due to the tax deductibility of interest payments, companies may prefer debt to equity. This means, most profitable firms will prefer to be highly levered than less profitable firms, in order to obtain tax shields. However, with the introduction of personal taxation by Miller (1977), M & M's (1963) argument seems to loose weight. Moreover, De Angelo and Masulis (1980) submit that, interest tax shields may be unimportant to companies with other tax shields, such as depreciation. Consequently, Myers and Majluf (1984) and Myers (1984) pecking-order theory predict that, firms will prefer internal to external capital sources. Therefore, it is hypothesized that:

*There is no positive relationship between gearing (CAPSTR) and profitability of a company.*

### Capital Structure and Tangibility

According to Jensen and Mekling (1976) the conflict of interest between debt providers and equity holders, generates adverse selection possibilities among decision makers in the organization. This therefore exposes those holding debt instruments to high level of risk, which results in their demand for higher returns. Bradley et al. (1984) opines that, there is a positive relationship between tangibility and gearing. Consistent with this finding of Bradley et al. (1984), Rajan and Zingales (1995) study of capital structure in the G-7 economies produces evidence to suggest a positive relation between tangibility (which is seen as the ratio of fixed to total assets) and debt. Chittenden, Hall and Hutchinson (1996) observed that, the relationship between tangibility and gearing is a function of debt applied. While there is a positive relationship between tangibility and long term debt, and negative for short-term debt. The submissions of Bradley et al. (1984) and Chittenden et al (1996) provide some reasonably strong priors with which it is hypothesized that there is a positive relationship between capital structure and tangibility:

*There is no positive relationship between gearing (CAPSTR) and a company's tangibility.*

### Capital Structure and Age

On the other hand, age of the firm is a standard measure of reputation in capital structure models. As a firm continues longer in business, it establishes itself as an ongoing business and therefore increases its capacity to take on more debt; hence age is positively related to debt (Abor, 2008). Before granting a loan, banks tend to evaluate the creditworthiness of entrepreneurs as these are generally believed to pin high hopes on very risky projects promising high profitability rates. In particular, when it comes to highly indebted companies, they are essentially gambling their creditors' money. If the investment is profitable, shareholders will collect a significant share of the earnings, but if the project fails, then the creditors have to bear the consequences (Myers, 1977). To overcome problems associated with the evaluation of creditworthiness, Diamond (1989) suggests the use of firm reputation. He takes reputation to mean the good name a firm has built up over the years; the name is recognized by the market, which has observed the firm's ability to meet its obligations in a timely manner. Directors concerned with a firm's reputation tend to act more prudently and avoid riskier projects in favour of safer projects, even when the latter have not been approved by shareholders, thus reducing debt agency costs - by reducing the "temptation" to gamble at creditors' cost.

This perspective has also been seconded within the context of small business. It is important to note the extension of firm risk to the personal area of the business person (given the unlimited liability of entrepreneurs) to be a way of managing the agency costs resulting from cases of more opportunistic behaviour. Given the fragmentation of information, and the high costs of control and evaluation, the firm's and the entrepreneur's reputations become a valuable asset in the management of relations between the principal (investor) and the agent (business person). Rajan and Zingales (1995) found that older firms should have higher debt ratios since they should be higher quality firms. Michaels et al (1999) agreed that age is positively related to long-term debt but negatively related to short-term debt. Lemmon et al (2001), however, found that age is negatively related to both long-term and short-term debt. We hereby assume in this study that:

*There is no positive relationship between gearing (CAPSTR) and age of a company.*

## METHODOLOGY

The population of study is made up of the 225 companies listed on the Nigerian Stock Exchange (NSE) as at 31<sup>st</sup> December, 2008. The cross-sectional survey research design was used in this study. This design was adopted because the selected companies making up the sample for this study are to be observed at a particular point in time. The major source of data for this work is the Secondary source of data which is the Nigerian Stock Exchange (NSE) Fact-book, 2008. The sample size was 124 of the 225 companies listed on the Nigerian Stock Exchange (NSE). The sample size is more than 50% of the population and therefore believed to be representative of the population.

The stratified random sampling and simple random sampling methods were used in this study. The reason for the choice of the stratified random sampling method is to ensure adequate or proportional representation of the different categories of companies that make up the population. Against this background, the research population, that is, all the 225 companies listed on the NSE as at 31<sup>st</sup> December, 2008, were organized into homogeneous subsets (sectors) with heterogeneity between the subsets. The appropriate number of companies was then selected from each subset, using the simple random sampling method (lottery technique).

The reason for also introducing the simple random sampling method is because, it made every company in each subset (sector) to have an equal and known chance of being selected. However, there was a major methodological weakness in this study. This limitation was the further reduction of the sample size from 114 to 110, which is only about 49% of the population of study. The reason for removing the 14 companies earlier sampled from the analysis was simply because in the course of collecting data, insufficient data were available on them.

The Ordinary Least Square (OLS) correlation method is to be used in estimating and analyzing the regression model stated below. The reason for the choice of the OLS method of data analysis is because; the test in this study is a test of association between capital structure and some independent variables (size, growth, profitability, tangibility and age). Also, the OLS regression is a good estimation technique in this study; given that, any form of violation in its assumptions can be corrected using auto – regression correction methods such as Cochran – Orcutt iteration method and Newton – Raphson iteration method.

### Model Specification

The theory behind this research is that; the Capital Structure of a firm (CAPSTR) is a function of five independent variables namely: firm size (SIZE), growth opportunities (GROWTH), profitability (PROF), tangibility (TANG), and age (AGE). This is presented in a relational form as follows: CAPSTR = f (SIZE, GROWTH, PROF, TANG, AGE) with the linear expression:

$$\text{CAPSTR} = \alpha_0 + \beta_1 \text{SIZE} + \beta_2 \text{GROWTH} + \beta_3 \text{PROF} + \beta_4 \text{TANG} + \beta_5 \text{AGE} + U_1$$

$\alpha_0, \beta_1, \beta_2, \beta_3, \beta_4$  and  $\beta_5$  are parameters to be estimated with the apriori expectation;

$\beta_1, \beta_2, \beta_3, \beta_4$  and  $\beta_5 > 0$  where:  $U_1$  is the error term

## DATA ANALYSIS AND RESULT

A total of one hundred and ten (110) companies' financial statements were analyzed. In appendix 1, the names of the 110 quoted companies are given along side the summary of figures made up of capital structure, size, profitability, tangibility, growth and age. The computations leading to the arrival of the figures are shown in appendix 2. The Ordinary Least Square (OLS) technique was used to estimate the parameters of the model specified by this study. The initial OLS result showed the presence of autocorrelation, which made correlation inevitable. The Cochran-Orcutt method was used to correct the serial correlation problem by experimenting with third autoregressive scheme.

The best results obtained are given as:

$$\text{CAPSTR} = -1.62E + 07 + 974518.6\text{SIZE} - 36299.1\text{PROF} + 7035\text{TANG} - 67788.8\text{AGE} + 52943.5\text{GROWTH}$$

(-3.00)
(4.19)
(-0.47)
(0.35)
(-2.23)
(1.39)

$$R^2 = 0.39$$

$$F - \text{Stat} (8, 98) = 7.7$$

$$DW - \text{Stat} = 2.09$$

The t values are presented in the parenthesis below the coefficients. The  $R^2$  values of 0.39, shows that about 39% of the total variations in CAPSTR can be explained by the independent variables, while about 61% cannot

be explained. The F value of 7.7 passes its significance test at the 5% level. This shows that there is a significant linear relationship between CAPSTR and the various independent variables used. Furthermore, the DW – Statistics of 2.09 shows the absence of serial correlation. This means that the error term is well behaved. In addition, all the variables except PROF and AGE pass their a priori signs. PROF and AGE take negative signs instead of positive signs. Only SIZE and AGE pass their t-test at their 5% level of significance, with values 4.19 and -2.23 respectively. This is due to the fact that both values are more than critical t-value of more than 2.05 using the two-tailed test. PROF, TANG and GROWTH fail their t-test. Finally, the result of this analysis suggests that AGE and SIZE are the major determining factors that influence the behaviour of CAPSTR. Thus a unit rise in SIZE will result in about 974518.6 units rise in CAPSTR, while a unit rise in AGE will lead to about 67788.8 reductions in CAPSTR.

## DISCUSSION

From the research carried out, it was confirmed that there are strong relationships between Size, Profitability, Tangibility, Growth, Age and Capital structure. It was found out that SIZE has a significant positive relationship with CAPSTR. This result is consistent with the views of Rajan and Zingales (1995) and Bevan and Danbolt (1999). This shows that as SIZE increases, CAPSTR will also increase. It was also found out that PROF does not have any positive relationship with CAPSTR. This also follows the views of Toy et al (1997), Titman and Wessels (1988), Rajan and Zingales (1995), Bevan and Danbolt and also Myers' (1984) pecking order theory. This means that as PROF increases, CAPSTR reduces.

Other findings in this study include the discovery that TANG does not have any significant impact on CAPSTR though it has a positive relationship with CAPSTR suggesting that as TANG rises, CAPSTR will also rise. This also follows the findings of Bradley et al (1984), Titman and Wessels (1988), Rajan and Zingales (1995), Bevan and Danbolt (1999), Scott (1977), Williamson (1988) and Harris and Raviv. But Chittenden et al found that it depends on the measure of debt applied. It was also found that GROWTH does not have any significant impact on CAPSTR but has a positive relationship with CAPSTR. This finding is contrary to the views expressed by Kester (1986) who submitted that there is a positive relationship between tangibility and capital structure. Smith and Warner (1979) submitted a positive relationship with dividend payout. But others like Rajan and Zingales (1995), Bevan and Danbolt (1999), Jensen and Meckling (1976), Myers (1977), Titman and Wessels (1988), Chung (1993) and Barclay et al (1995), all found a negative relationship between Growth and Capital structure. Thus, from the results of this study, it is obvious that as GROWTH increases, CAPSTR will increase. The finding that AGE has a significant negative relationship with CAPSTR is consistent with the view of Abor (2008). This means that as AGE increases, CAPSTR reduces.

## CONCLUSION

The issue of the determinants of corporate capital structure of a firm remains to date one of the most debated topics in corporate finance theory. Equally elusive has been the answer as to how corporate finance managers determine their capital structure. This study makes an attempt to add to the growing body of literature on the issue of corporate capital structure by empirically examining the relationship within the context of the Nigerian economy. While some of the findings are in line with research conducted elsewhere, others (for example, growth) seem to conflict with existing literature on the issue.

The study selected a rather small sample of 110 firms quoted on the Nigerian Stock Exchange over the period 2000-2005, due to the unavailability of data necessary for the purpose of the research. The findings are however encouraging enough to set forth future research agenda on a larger sample of firms with a disaggregated set of dependent variables to further explore the issue of corporate capital structure. Such research, the authors believe, would throw more light on the controversy and hence form a more comprehensive view of the determinants of corporate capital structure. Thus the importance and significance of corporate capital structure decisions in the context of management of businesses can hardly be mitigated.

The results of this study have delivered some insights on the capital structure of Nigerian companies. The issue of capital structure is an important strategic financing decision that firms have to make. It is therefore recommended that:

1. Following from the findings in this study that, size and age of a firm are significant determinants of its capital structure, it is therefore recommended that, directors of companies in Nigeria should pay more attention on two key capital structure indicators (size and age) so as to be in a good position to manage their capital structure for better performance.

2. There should be policies intended to encourage unquoted firms to gain access to the capital market by, for example, reducing listing requirements and subsidizing flotation costs. This will help them grow in size and invariably impact on their capital structure.
3. Considering that export-oriented firms and limited liability companies have easier access to finance, firms should think about entering the international markets to consider more organized forms of business. This will impact positively on their size, tangibility and growth options.
4. Overall, further research work should be carried out to discover other determinants of corporate capital structure because as Stewart Myers (2001) unambiguously suggests, “there is no universal theory of the debt-equity choice and no reason to expect”.

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## APPENDICES

### Appendix 1

S/N	NAMES OF COMPANIES	CAP STR	SIZE	PROF.	TANG	GROWTH	AGE
1	INCAR NIGERIA PLC	88992	18.933	-10.119	51.059	-7.4	26
2	OKOMU OIL PALM CO. PLC	4404186	21.626	12.908	82.276	18.6	26
3	PRESKO PLC	3718240	21.577	10.559	77.868	15.42	13
4	DUNLOP NIG PLC	3935349	23.34	-1.57	83.031	6.2032	44
5	R.T. BRISCOE (NIG) PLC	1857730	22.768	9.513	12.313	2.6	48
6	AVIATION DEVT. CO. PLC	1629863	21.824	6.345	9.78	15.6	21
7	UNION HOMES SAVINGS & LOANS PLC	54776000	23.028	0.829	4.071	16.6	13
8	GUINNESS NIG PLC	18227442	24.574	12.561	58.393	19.6	55
9	INTERNATIONAL BREWERIES PLC	1232264	19.81	-130.745	64.087	1.32	34
10	JOS INTERNATIONAL BREWERIES PLC	447472	20.544	5.074	12.025	8.8	30
11	NIGERIAN BREWERIES PLC	28674191	25.108	17.546	71.324	25.8	59
12	ASHAKA CEMENT PLC	11633603	23.484	37.683	23.566	14.4	31
13	BENUE CEMENT CO. PLC	3674201	22.111	6.948	90.153	-22.2	30
14	CEMENT CO. OF NORTHERN NIG PLC	1606914	22.501	6.01	42.953	33	43
15	NIGERIAN ROPES PLC	303629	19.85	3.955	23.671	14.8	45

16	BERGER PAINTS NIG.PLC		883924	21.373	-25.794	61.713	9	46
17	WEST AFRICAN PORTLAND CEMENT		24877275	24.005	7.01	67.844	29.5	46
18	AFRICAN PAINTS (NIG) PLC		43641	19.24	-20.595	70.992	2.8	31
19	CHEMICAL & APPLIED PRODUCTS PLC		649317	21.146	22.232	11.834	10.2	40
20	UNION VENTURES & PETROLEUM PLC		25209	18.167	8.104	70.963	22.6	29
21	IPWA PLC		165425	19.492	-6.019	72.252	-10.2	44
22	AFRIBANK NIG PLC		23362000	23.433	0.707	4.612	5.4	46
23	PREMIER PAINTS PLC		82836	19.329	9.794	21.106	18	23
24	TRANS NATIONWIDE EXPRESS PLC		87910	19.027	16.804	28.784	1.74	21
25	NCR (NIG) PLC		69161	20.574	6.549	9.808	13.2	56
26	THOMAS WYATT NIG. PLC		285243	17.362	-43.834	95.992	-57.6	57
27	FIRST CITY MONUMENT BANK PLC		7466216	21.273	2.13	3.708	7.8	23
28	A.G. LEVENTIS (NIG) PLC		3676466	22.674	9.546	44.743	15.8	47
29	CFAO NIG. PLC		464723	23.87	-10.258	21.482	10.804	36
30	AIICO INSURANCE PLC		5624340	21.799	0.81	28.786	10.4	35
31	JOHN HOLT PLC		2224000	22.94	0.227	44.226	-5.2	44
32	PATERSON ZOCHONIS INDUSTRY PLC		20304690	24.257	13.304	36.407	14.4	57
33	SCOA NIGERIA PLC		1004000	22.226	-6.008	4.506	-2.2	36
34	CRUSADER INSURANCE PLC		2315943	20.996	4.323	1.247	6.8	35
35	UNILEVER NIGERIA PLC		84981745	24.232	9.326	31.251	19.4	32
36	LAW UNION & ROCK INSURANCE		1308676	20.203	8.445	21.875	18.8	36
37	COSTAIN (WEST AFRICA) PLC		2402516	21.519	-10.627	44.26	17.8	57
38	JULIUS BERGER NIG PLC		2997882	24.408	2.051	24.698	9.4	50
39	LINKAGE ASSURANCE PLC		1851745	20.858	11.029	9.197	36.4	14
40	ADSWITCH PLC		29982	17.832	12.257	22.943	-31	23
41	CUTIX PLC		152779	20.168	13.807	20.29	18	23
42	RAK UNITY PETROLEUM PLC		18925724	17.7	12.204	51.528	40.667	20
42	CAPITAL OIL PLC		4017258	18.412	-5.923	57.93	43.4	20
44	SMART PRODUCTS NIG PLC		55203	16.929	-8.813	99.428	-489.6	39
45	ROYAL EXCHANGE ASSURANCE NIG.		3019509	21.249	3.173	2.549	22.2	36
46	WAPIC INSURANCE PLC		1801429	20.987	12.25	8.961	32.6	47
47	ONWUKA HI-TEK INDUSTRIES PLC		238641	17.2	-12.735	93.368	15.8	25
48	7-UP BOTTLING COMPANY PLC		4409059	23.577	10.865	52.074	16.8	46
49	FLOUR MILLS NIGERIA PLC		26264314	25.184	12.729	53.192	21.2	45
50	NESTLE NIG PLC		5413841	24.259	46.861	36.642	21.6	44
51	NIGERIAN BOTTLING COMPANY PLC		18624823	24.739	8.517	66.721	15.6	54
52	ENPEE INDUSTRIES PLC		520479	21.086	-9.565	32.731	1.8	37
53	UNION DICON SALT PLC		219167	21.011	-35.92	31.024	-20	13
54	LENNARDS NIG PLC		29684	16.618	-14.534	71.786	28.6	52
55	EKOCORP PLC		524159	19.691	8.684	48.499	10	21
56	EVANS MEDICAL PLC		1485183	21.585	-1.863	35.715	22.6	51
57	GLAXOSMITHKLINE CONSUMER PLC		3046348	22.69	22.007	35.246	18.8	34
58	MAY & BAKER NIG PLC		751751	21.415	7.945	29.64	13.4	61
59	MORISON INDUSTRIES PLC		110177	19.005	10.759	20.651	10.8	50
60	VITAFOAM NIG PLC		785436	21.983	8.948	25.872	7	43
61	TOURIST COMPANY OF NIGERIA PLC		1202004	20.765	-0.755	84.931	33.4	41
62	ALUMINIUM EXTRUSION INDUSTRY PLC		491331	20.297	-0.713	60.301	27.6	23
63	B.O.C. GASES PLC		371753	20.844	7.034	65.635	12	46
64	FIRST ALUMINIUM NIGERIA PLC		1657828	22.815	4.051	38.831	16.4	45
65	C & I LEASING PLC		449150	20.878	5.685	54.977	25.4	15
66	NIGER INSURANCE PLC		3271626	20.726	3.722	15.676	6	43
67	FIRST ASSURANCE PLC		166721	17.314	-17.457	8.326	24.2	21

68	LASACO ASSURANCE PLC		1957695	20.68	8.824	30.776	22.4	26
69	UNIC INSURANCE PLC		1256633	20.608	6.01	6.652	-1.4	40
70	SECURITY ASSURANCE PLC		136183	17.84	2.544	27.911	13	24
71	STANDARD ALLIANCE ASSURANCE PLC		1669509	20.965	9.904	19.155	21.4	24
72	STOKVIS NIGERIA PLC		9981	12.236	1.583	59.216	-0.2	48
73	JUPAUL OIL & MARITIME SERVICE PLC		693215	20.094	11.613	68.537	19	NIL
74	AVON CROWNCAPS & CONTAINERS		1430388	22.363	4.339	21.553	15.2	28
75	GREIF NIGERIA PLC		230932	20.19	-4.113	41.933	26.6	65
76	NAMPAK NIGERIA PLC		650715	21.333	3.796	24.752	4.4	45
77	TEXACO NIGERIA PLC		4163182	24.673	12.471	25.368	19.8	27
78	TOTAL NIGERIA PLC		6789052	25.565	16.648	26.746	22.6	49
79	BETA GLASS INDUSTRIES PLC		4985891	22.297	1.702	65.905	2.4	31
80	ACB INTERNATIONAL BANK PLC		3561272	20.811	0.334	30.479	33.4	68
81	ACCESS BANK PLC		28893886	23.316	0.641	2.265	37	16
82	CO-OPERATIVE BANK PLC		2807187	22.104	1.926	5.528	36.2	52
83	DIAMOND BANK PLC		20689318	23.268	2.676	2.57	31.4	6
84	ECOBANK NIGERIA PLC		25762863	22.954	3.348	3.498	32	19
85	EIB INTERNATIONAL BANK PLC		2828097	22.3	3.289	7.218	17.6	19
86	FIDELITY BANK PLC		3519624	22.432	3.911	3.66	41.4	18
87	FIRST BANK OF NIGERIA PLC		48726000	24.771	3.527	2.695	11.6	111
88	FIRST INLAND BANK PLC		3631924	22.142	1.996	6.436	34.6	23
89	GUARANTEE TRUST BANK PLC		45587418	24.238	3.401	3.923	28.4	15
90	GUARDIAN EXPRESS BANK PLC		15654226	22.334	8.483	1.912	38.4	5
91	UNIVERSAL TRUST BANK PLC		3452846	22.707	1.704	4.963	42.8	20
92	NAL BANK PLC		5629061	22.429	7.016	8.589	17.14	45
93	OCEANIC BANK INTERNATIONAL NIG		31091681	23.914	3.336	2.402	30	15
94	OMEGA BANK PLC		3271000	22.144	3.902	9.79	14.8	24
95	PLATINUMHABIB BANK PLC		12660336	22.617	2.042	3.258	47.8	16
96	SKYE BANK PLC		3186098	21.881	1.194	3.541	60.6	6
97	TRANS INTERNATIONAL BANK PLC		18798991	22.111	3.155	4.755	26.6	18
98	UNION BANK OF NIGERIA PLC		39129000	24.525	3.001	3.636	24.2	36
99	UNITED BANK FOR AFRICA PLC		21119000	23.985	2.6	2.463	6	44
100	IBTC - CHARTERED BANK PLC		15654226	22.334	8.483	1.912	38.4	16
101	WEMA BANK PLC		8040348	23.277	1.988	5.694	24.6	60
102	ZENITH BANK PLC		37789662	24.276	2.78	4.573	43.4	15
103	CAPPA & D'ALBERTO PLC		1057169	15.475	12.663	12.421	18.2	55
104	JULI PLC		119804	18.832	1.156	49.16	20.6	25
105	UNIVERSITY PRESS PLC		332162	19.494	9.864	31.855	4	27
106	UACN - PROPERTY DEVT. CO. PLC		16539841	22.238	3.694	77.767	19.2	8
107	CADBURY NIGERIA PLC		17810830	24.106	12.13	24.129	18.8	40
108	NORTHERN NIGERIA FLOUR MILLS PLC		775783	22.412	11.02	11.215	16	34
109	CHRISTLIEB PLC		749087	17.905	-8.22	93.069	-115	30
110	GREAT NIGERIA INSURANCE CO. PLC		1731228	20.364	6.32	6.539	34	45

Source: Annual Reports and Accounts of Companies sampled.

Ordinary Least Squares Estimation

\*\*\*\*\*

Dependent variable is CAP

110 observations used for estimation from 1 to 110

\*\*\*\*\*

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
INPT	-3.04E+07	8899421	-3.4154[.001]
SIZE	1879492	407207.1	4.6156[.000]
PROF	-91241.7	87160.8	-1.0468[.298]
TANG	-65309.1	34209.1	-1.9091[.059]
GROWTH	-3482.5	17723.6	-.19649[.845]
AGE	-44117.8	52604.9	-.83866[.404]

\*\*\*\*\*

R-Squared	.24798	R-Bar-Squared	.21182
S.E. of Regression	8809385	F-stat. F( 5, 104)	6.8587[.000]
Mean of Dependent Variable	5819037	S.D. of Dependent Variable	9922782
Residual Sum of Squares	8.07E+15	Equation Log-likelihood	-1912.0
Akaike Info. Criterion	-1918.0	Schwarz Bayesian Criterion	-1926.1
DW-statistic	1.9076		

\*\*\*\*\*

Diagnostic Tests

```

*****
*      Test Statistics      *      LM Version      *      F Version      *
*****
*      *      *      *
* A:Serial Correlation*CHSQ( 1)= .24062[.624]*F( 1, 103)= .22580[.636]*
*      *      *      *
* B:Functional Form *CHSQ( 1)= 23.6141[.000]*F( 1, 103)= 28.1556[.000]*
*      *      *      *
* C:Normality *CHSQ( 2)= 175.1791[.000]*      Not applicable      *
*      *      *      *
* D:Heteroscedasticity*CHSQ( 1)= 25.9257[.000]*F( 1, 108)= 33.3036[.000]*
*****

```

- A:Lagrange multiplier test of residual serial correlation
- B:Ramsey's RESET test using the square of the fitted values
- C:Based on a test of skewness and kurtosis of residuals
- D:Based on the regression of squared residuals on squared fitted values

Ordinary Least Squares Estimation

\*\*\*\*\*

Dependent variable is CAPSTR

110 observations used for estimation from 1 to 110

\*\*\*\*\*

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
INPT	-1.44E+07	5646305	-2.5526[.012]
SIZE	917811.2	248991.2	3.6861[.000]
PROF	-101912.6	79276.7	-1.2855[.201]
TANG	-28824.9	21796.3	-1.3225[.189]
AGE	-34199.4	38734.7	-.88291[.379]
GROWTH	49657.0	42838.5	1.1592[.249]

\*\*\*\*\*

R-Squared	.20492	R-Bar-Squared	.16670
S.E. of Regression	5608215	F-stat. F( 5, 104)	5.3609[.000]
Mean of Dependent Variable	3421955	S.D. of Dependent Variable	6143601
Residual Sum of Squares	3.27E+15	Equation Log-likelihood	-1862.4
Akaike Info. Criterion	-1868.4	Schwarz Bayesian Criterion	-1876.5
DW-statistic	1.1293		

\*\*\*\*\*

Diagnostic Tests

```

*****
*      Test Statistics      *      LM Version      *      F Version      *
*****
*      *      *      *
* A:Serial Correlation*CHSQ( 1)= 22.6788[.000]*F( 1, 103)= 26.7509[.000]*
*      *      *      *
* B:Functional Form *CHSQ( 1)= 8.3350[.004]*F( 1, 103)= 8.4444[.004]*
*      *      *      *
* C:Normality *CHSQ( 2)= 1316.6[.000]*      Not applicable      *
*      *      *      *
* D:Heteroscedasticity*CHSQ( 1)= 19.6893[.000]*F( 1, 108)= 23.5458[.000]*
*****

```

A:Lagrange multiplier test of residual serial correlation  
 B:Ramsey's RESET test using the square of the fitted values  
 C:Based on a test of skewness and kurtosis of residuals  
 D:Based on the regression of squared residuals on squared fitted values

Cochrane-Orcutt Method AR(3) converged after 4 iterations

\*\*\*\*\*

Dependent variable is CAPSTR

110 observations used for estimation from 1 to 110

\*\*\*\*\*

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
INPT	-1.62E+07	5380257	-3.0042 [.003]
SIZE	974518.6	232590.5	4.1898 [.000]
PROF	-36299.1	77232.1	-.47000 [.639]
TANG	7035.0	19904.0	.35345 [.724]
AGE	-67788.8	30336.6	-2.2346 [.028]
GROWTH	52943.5	38175.5	1.3868 [.168]

\*\*\*\*\*

R-Squared	.38644	R-Bar-Squared	.33635
S.E. of Regression	5067668	F-stat. F( 8, 98)	7.7153 [.000]
Mean of Dependent Variable	3421955	S.D. of Dependent Variable	6143601
Residual Sum of Squares	2.52E+15	Equation Log-likelihood	-1799.0
Akaike Info. Criterion	-1808.0	Schwarz Bayesian Criterion	-1820.2
DW-statistic	2.0934		

\*\*\*\*\*

Parameters of the Autoregressive Error Specification

\*\*\*\*\*

$$U = .50637*U(-1) + -.10411*U(-2) + .15473*U(-3) + E$$

( \*NONE\*) ( \*NONE\*) ( \*NONE\*)

T-ratio(s) based on asymptotic standard errors in brackets

\*\*\*\*\*