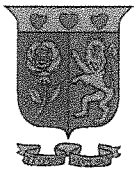

Strathmore
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ANALYSIS OF THE MACROECONOMIC DETERMINANTS OF A FIRM'S CAPITAL STRUCTURE

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Submitted in partial fulfillment of the requirements for the Degree of Financial Economics at Strathmore University

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DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of my knowledge and belief, the Research Project contains no material previously published or written by another person except where due reference is made in the Research Project itself.

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This Research Project has been submitted for examination with my approval as the Supervisor.

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ABSTRACT

This study analyses the relationship between macroeconomic factors and the capital structure of 55 listed companies in Kenya. The questions answered are what is the effect of macroeconomic conditions on capital structure and is there a difference in effects across segments? . Panel data analysis is applied and a random effects model is used for the sample period 2004-2014. Fisher type unit root test is used to test for panel data stationarity. The segments analyzed in the research include; agricultural sector, manufacturing & allied, investment, banking, insurance, construction & allied, energy & petroleum, automobiles & accessories and commercial & services. The leverage ratios tested were debt to equity and total debt ratio. The independent variables tested were GDP, inflation, interest rates, exchange rates, asset tangibility and size. The findings of the study indicate that the macroeconomic determinants do not have an effect on the capital structure decisions of the listed firms as a whole. Results of the analysis of the different segments concluded that interest rate and inflation had an effect on the agricultural companies' capital structure decisions while interest rate, inflation and exchange rate had an effect on the energy and petroleum industries capital structure decisions. In conclusion none of the macroeconomic determinants affect the industry as a whole but interest rate, inflation and exchange rate are the macroeconomic determinants that are significant across the segments.

Keywords: Capital structure, GDP, inflation, interest rate, size, asset tangibility

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CHAPTER ONE

1. INTRODUCTION

1.1 BACKGROUND

Capital structure is the combination of debt and equity that funds an organization's strategic plan. The "right" capital structure supports strategic financial goals, while optimizing flexibility and minimizing cost. Capital structure management is approached by answering the question, what are the appropriate amount, mix, structure, and cost of debt and equity to support the organization's strategic financial goals?

Firms use different sources of funds to finance their activities. The choice of the source of finance is at the discretion of the managers. Managers' selection of the capital structure composition of the firm has been an area of interest in the field of finance and financial economics. The key benefits of effective capital structure management are increased capital access, flexibility and lower overall cost of capital.

The traditional view of capital structure was the first theory to be developed stating that when the Weighted Average Cost of Capital (WACC) is minimized and the market value of assets are maximized an optimal stricture of capital exists. A firm's value increases to a certain level of debt capital after which it tends to remain constant and eventually decreases.

Miller (1963) studied capital structure theory. Based on their analysis, they developed the capital structure irrelevance proposition. This stated that in perfect markets it doesn't matter what capital structure a company uses to finance its operations. Stating that the market value of a firm is determined by its earning power and the risk of its underlying assets and its value is independent of the way it chooses to finance its investments or distribute dividends.

Other theories were later on developed to relax the theories of Modigliani and Miller.

Lakshmi Shyam-Sunder (1999) in his paper testing static tradeoff against pecking order models of capital structure talked about how the tradeoff theory focuses on the benefits of financing with debt. It recognizes the tax benefits of interest payments .The marginal benefit of increases in debt declines as debt increases while the marginal cost increases so that a firm that wants to optimize its value will focus on this trade off.

In the same paper he also talks about the pecking order theory stating that it tries to capture the cost of asymmetric information. Stating that companies prioritize their sources of finance, moving from internal financing to equity and mostly using equity as the last resort. Hence internal financing is used first then debt and when debt can no longer be issued equity is issued.

Therefore a firm needed to decide which capital structure was best for them based on the theories to maximize the firm value. Earlier studies such as Chen (2004) focused on firm specific structures that determine capital structure, and determined that the variables mainly considered by manager were size, growth, asset structure and distress costs.

In his paper he commented that growth opportunities were significant for firms capital structure stating that firms holding future growth opportunities which are in the form of intangible assets tend to borrow less than firms holding more tangible assets because growth opportunities cannot be collaterized. Another variable that he considered was distress stating that there exists a negative relationship between the distress and the leverage therefore more firms tend to borrow when the probability of bankruptcy reduces.

Later on other written works came up to address the fact that it is not only firm specific factors that affect capital structure but also macroeconomic factors in the economy can determine a firm's capital structure.

Booth (2001) was among the first papers to focus on the macroeconomic determinants of a firm's capital structure. In his paper he compared the capital structure between developing and developed countries and came to the conclusion that the same factors that affect developed countries also affect developing countries.

Many other papers followed after reflecting on the same idea. Hachbarth (2006) studied the impact of macroeconomic conditions on credit risk and dynamic capital structure choices. Korajezyk (2003) addressed the question "why does capital structure choice vary with macroeconomic conditions? "

1.2 PROBLEM STATEMENT

Evidence indicates that capital structure of a firm is determined by both firm specific variables as well as external macroeconomic variables as seen in Gajurel (2005) as well as Burchuladze (2014) where he studied the same factors but in Swedish firms. Most of the prior studies such as Kariuki (2014) focus on the firm specific variables in firms. This study will factor in macroeconomic variables and determine the magnitude of their effect on a firm's capital structure using a more efficient model that will deal with the inefficiency in the simple multi linear regression model used by Muthama, Mbaluka & Kalunda (2013) in their study of macroeconomic influences on corporate capital structure of listed firms in Kenya. This study will also employ a random effect that increase the degree of freedom, deals with multi-collinearity and heteroscedasticity issue among the explanatory variables thus decreasing it and consequently allows for more efficient estimates. The random effects model also deals with firm heterogeneity, which is caused by characteristics that differ among firms but are invariant over time.

1.3 OBJECTIVE

The main aim of this research is to establish the effect of GDP growth rate, inflation, interest rate and exchange rate on capital structure decisions of listed firms in Kenya.

1.4 RESEARCH QUESTIONS

1. What is the effect of macroeconomic factors on capital structure decisions of listed firms in Kenya?
2. Is there a difference in the effects of these macroeconomic factors across different segments?

1.5 HYPOTHESIS

H_0

$= there\ are\ no\ similarities\ in\ the\ effects\ of\ the\ macroeconomic\ factors\ across\ the\ segments$

H_1

$= there\ are\ similarities\ in\ the\ effects\ of\ macroeconomic\ factors\ across\ the\ segments$

1.6 SIGNIFICANCE

The results of this study will be of great significance to managers of the different institutions. Company managers will find that they have to consider the connection between their own company's development and changes in the macroeconomic environment in order to make the manager of the company more flexible and efficient during the decision making process especially when deciding on capital structure of the firm.

This study will also contribute to the economics and finance literature. By extending the empirical study by Muthama et al (2013), through using the random effects model to determine the macroeconomic conditions that affect capital structure to arrive at more accurate results. This will help other scholars in their future studies and will also provide a basis into further investigation for more efficient models based on our results.

CHAPTER TWO

2. LITERATURE REVIEW

This chapter starts by discussing the macroeconomic factors that affect capital structure of companies overall and the put into the context of listed Kenyan companies. Korajecyk (2003) argue that the variations in the macroeconomic conditions should affect the choice of capital structure. Therefore we look at the different type of variables that have been used to capture macroeconomic conditions and determine the magnitude of their effect on capital structure. Mainly focusing on inflation, GDP and interest rate.

2.1 Inflation and capital structure decisions

In economics, inflation is a sustained increase in the general price level of goods and services in an economy over a period of time.

Corcoran (1977) was among the first authors to look into inflation and its effect on corporate investment incentives. He considers that an increase in inflation causes decreases in the real value of debt. The demand for corporate bonds increases during periods of inflation.

This was later on upgraded in the Miller (1963) paper where he linked the two variables by considering tax structure. He argues that even in a world in which interest payments are fully deductible in computing corporate income taxes, the value of the firm in equilibrium will still be dependent on the capital structure. He fully allows investors to freely choose their portfolio in his mode; and he concludes that marginal tax differs across states of nature depending on the taxable personal income. If this is so then progressive taxes make inflation a source of government revenue since it may bring taxpayers to higher tax brackets.

Senbet (1988) cites that Miller only determined the optimal level of debt for the aggregate corporate sector and introduces uncertainty and progressive marginal taxes. He looked into the effect of taxes and depreciation on corporate investment and financial leverage. To analyze the investment and financing decisions of firms they employed a simple two date state preference model that extends the DeAngelo and Masulis capital structure model by endogenizing the firm's investment decisions. He noted that inflation affects a firm's capital structure therefore forcing managers to sell bonds and invest in stocks. Therefore the firm's capital structure that is measured as debt-to-equity drops. The similarities with this paper as that the debt to equity ratio is also used as a measure of leverage.

Dokko (1989) in his paper tries to understand whether changes in inflation expectations are capitalized in the stock prices. He performs a regression and finds empirical support using micro firm data for the nominal contracting hypothesis. This hypothesis states that changes in expected inflation create wealth redistribution between creditors and debtors. The author goes ahead to improve the model by recognizing that a firms asset and capital structure variables are balance sheet constrained and controlling for individual firm risk differences and capital gains taxation.

This poses a difference with this paper since capital gains taxation is not controlled as that taxation is very new in our economy and there is very little information based on it.

Hodder (1990) wanted to develop a theory of capital structure in an international setting with corporate and personal taxes to characterize an international equilibrium with different international taxation and inflation in otherwise perfect international capital markets. This is mostly dealing with an international framework while this paper is looking at a local framework.

Maksimovic (1998) in their paper determinants of capital structure in developing countries used a firm level survey data for 11,125 firms from World Bank conducted for 25 developing countries from 5 regions and multiple regressions using panel data. Pointed out that inflation shows us the government's management of the economy as well as provides evidence on the stability of the local currency. Countries with high inflation are associated with high uncertainty. Debt contracts are usually nominal contracts the rate of inflation may influence the riskiness of debt financing so that lenders are more likely to avoid providing debt, therefore inflation is negatively related with leverage and debt maturities for firms.

Jesus (2001) draws a contradicting conclusion in his paper. He studies the effect of inflation on capital structure using the Dammon effect model. Using times series for the period 1978-1996 and cross sectional data from forty major American companies, in his regressions where he assumes a unique slope in the inflation coefficient he finds no relationship and even in the case where the slopes vary only one out of forty firms shows a negative slope.

There are a number of possible indirect ways that inflation can affect a firm's capital structure. The empirical testing of these effects has been done mainly using aggregate measurements of the different variables involved in the models. This paper also aims to test whether inflation is one of the macroeconomic variables that affect a firm's capital structure.

2.2 Interest rate and capital structure decisions

Interest rates play a major role in the pricing of securities and the allocation of capital by businesses and investors. This applies to both debt and equity capital by businesses and investors and is therefore of utmost importance to investors.

Gulati (1977) states that interest rate fluctuations can also have major effects on the firm's profitability and financial slack growth. As the firm's interest expense on existing debts increases, taxable income decreases. Yet, a firm's potential to grow can be unaffected for a certain period of time if interest rates rise but the firm's cost of debt does not rise simultaneously because the firm's debt contracts have fixed interest rates. The percentage of the firm's debt contracts that have interest rates tied to certain market rates will determine to what extent the firm's profitability and its prospects for growth in financial slack are exposed to interest rate fluctuations. This is also an effect looked into in this paper

Myers (1984) while studying about the capital structure puzzle states that inflation is of great importance to the firm due to the relationship between interest rates and inflation in determining the capital structure of a firm.

Jalilvand (1984) in his paper corporate behavior in adjusting to capital structure and target debt aimed to prove that financial decisions are part of a simultaneous process and suggest that firms adjust to long term financial targets. He looked into the United States of America Corporation. There are also indications that firms tend to target long term debt and stock issues. Expectations of lower long-term debt in the future tend to postpone the issuance of long-term debt and increase the issue of short-term debt and external equity financing. This implies that interest rate does influence capital structure.

Singh (1993) in his paper principles of macroeconomics studied New Delhi and the capital structure decisions of different companies when it comes down to investment and states that in the long run interest rate influences investment activity. An increase in interest rates will lead to a fall in investment. A low rate of interest leads to increased investment activity. Increase in investment leads to use of more debt as a means of financing. Therefore there is a relationship between interest rate, investment and debt. Therefore this is a very important variable that is

included in this study. It should be noted that short-term changes in interest rate are inelastic and fail to influence investment. In this paper only long term interest rates is used in the form of total debt ratio.

Yang (2001) looked into interest rates by considering interest swaps and there effect on capital structure. The effects of swap usage on corporate financing decisions are empirically examined. Through the employment of a regression model the results show that firms with higher effective tax rates reduce their optimal debt ratio range when the y use interest rate swaps. Therefore this can lead to the implication that the use of swaps can help firms stick to an initial high debt ratio and make more use of the large tax benefits of debts on debt financing decisions. This paper will not look into interest rate swaps since the Kenyan economy has not yet introduced the trading of interest rate swaps.

In general the past researchers arrive at the same conclusion that this paper investigates to find out whether interest rate has the same effect across all the different sectors of the listed companies.

2.3 Exchange rate and capital structure decisions

In the present economy exchange rate volatility has an increasing effect on companies operations and profitability. Exchange rate management is a subject of great importance to managers. The main exchange rate considered is (KES/USD) in our study.

Exchange rate leads to exchange rate risk. Allayanis (2001) in his paper examined the use of foreign currency derivatives by S&P non-financial firms and potential impact on exchange-rate risk. Revealing that fluctuations in a firm's exchange rate can affect the firm's choice on financing. When the local currency depreciates they end up reducing the amount of foreign debt. If they end up not being able to change the foreign currency debt into local currency debt then they result to decreasing the amount of liabilities. This is a similar conclusion that this paper hopes to arrive at.

Broll & Wong (2005) studied the financing and hedging decisions of a risk adverse multinational firm having a wholly owned foreign subsidiary. Management of exchange rate risk of the firm is shown to have impacts on the capital structure decision of the international firm and also affects its dominating currency decision. In the event of a currency forward market then the firm will devise its international capital structure so as to minimize the global weighted average cost of capital. If the firm does not do that then they will have to rely on a money market hedge through issuing more foreign currency denominated debt and less domestic currency denominated debt. This will result in a higher global weighted average cost of capital.

2.4 GDP Growth Rate and capital structure decisions

This is the monetary value of all the finished goods and services produced within a country's borders within a specific time period though GDP is usually calculated on annual basis. This is one of the primary indicators used to gauge the health of an economy.

Booth (2001) in his paper capital structure in developing countries compares capital structure in both developing and developed countries used a basic empirical cross sectional regression model and found that GDP growth does have an effect on debt. The effect is felt as an increase on total debt ratio and long-term book debt ratio. He went on to generally conclude that even though debt ratios in developing countries seem to be affected in the same way by the same types of variables there are systematic differences in the way these ratios are affected by country factors especially GDP. This paper is also not including book to debt ratio as one of the dependent variables to measure leverage.

Korajezyk (2003) in his paper testing the firm specific and macroeconomic determinants of a firm's capital structure splits his sample of firms based on financial constraints. Mostly focusing on American constrained and unconstrained firms. Performs a multiple linear regression on the different variables and found that growth rate positively affect leverage ratio. Target leverage is seen to be counter-cyclical for the unconstrained sample of firms and pro-cyclical for constrained. He also went on to generally conclude that macroeconomic conditions are significant for issue choice of unconstrained firms but less for constrained. This paper is different from this research as the firms not sampled into constrained and unconstrained firms but are segmented according to the sectors that they operate in.

Gajurel (2005) in his paper capital structure management in Nepalese firms studied 50 different firms and his findings resembled the findings of Korajezyk (2003) though he was looking at Nepalese firms and came to the conclusion that GDP growth rate was negatively related to the leverage ratio. He later went on to state that economic growth tends to cause firms to use more debt. These findings are consistent with the findings of Booth (2001)

Cook (2007) in his paper macroeconomic conditions and readjustment speed was determining the macroeconomic decisions through a multiple linear regression model based on panel data and their readjustment speed is different from this paper. The main focus is on testing whether GDP,

inflation, exchange rate and interest rate effect capital structure and not looking into the readjustment speed. He finds that firms adjust to target leverage in good states faster than in bad states. GDP is a significant determinant of a country's economy state hence the GDP is seen as a very important determinant of a firm's capital structure.

Therefore these papers lead to the inclusion of GDP growth rate as one of the variables that is tested using the random effects model.

CHAPTER THREE

3. METHODOLOGY

The methodology used in this paper is based on the work of Burchuladze (2014) who carries out an analysis of the relation between macroeconomic factors and capital structure theory applicable in Sweden. Using the random effects model investigating 233 Swedish firms using a sample period from 2002-2012. Also more references on the methodology are taken from (Wooldridge, 2013)

This study analyses Kenyan market capital structure by using firms listed in the Nairobi Securities Exchange and macroeconomic variables based on the Kenyan economy.

3.1 Population and Sample Selection

This study uses data from the annual report of 55 Kenyan public-listed companies for the period 2004-2014. The following companies are excluded from the 65 listed companies on the NSE due to lack of adequate data from the financial statements; Liberty Holdings, Umeme, Longhorn, Hutchings Biemer, Atlas Development, Home Afrika, Kurwitu, Barclays, Flametree, Eaagads and Limuru tea. The 55 companies are divided into their different sectors. The different segments are investment, insurance, energy& petroleum, manufacturing and allied, telecommunications & technology, agricultural, automobiles & accessories, banking, investment services, commercial& services and construction and allied. The telecommunications and investment services companies are excluded from the analysis across different sectors, because there is only one company in each sector. That is Safaricom is the only company in the telecommunications sector and NSE is the only company in the investment services sector. The reason for this is that panel data analysis cannot be applied on only one company. Therefore they are excluded due to lack of consistency in the panel data analysis.

3.2 Research design

The research design used in this paper is the correlation research design. Here the objective is to test whether there is any relationship between the macroeconomic factors (inflation, interest rate, exchange rate and GDP) with a firm's capital structure.

3.3 Data Collection

Data collection is collected from different platforms such as the CBK website, company websites and the Nairobi stock exchange. Leverage to debt ratios is obtained from the financial statements of each company from the company websites and the Capital Markets Authority office library. Variables such as inflation rates, interest rates, GDP and exchange rates are sort from the CBK website.

3.4 Data Analysis

Panel data is used to examine the relationship. "This is because panel regressions control for any individual heterogeneity effects present in the company. It also increases on the degrees of freedom, deals with the collinearity issue among the explanatory variables (decreases it), and consequently allows for more efficient estimates." (Burchuladze, 2014) Also the study is observing the same cross sectional unit (country) across time hence more reason to why a panel data regression model is suitable. Fisher type test unit root test using Augmented Dickey Fuller will be applied to ensure that all the data used is stationary. Variables will be analyzed in their log form in order to deal with heteroskedasticity.

From the study of Wooldridge (2013) both fixed and random effects models can be applied to deal with firm heterogeneity, which may be caused by characteristics that differ among firms but are invariant over time. They can both also address the problems of multicollinearity and heteroscedasticity. The Hausman test is applied to determine which of the two models is the most appropriate for the analysis.

3.5 Model Specification

This paper adopts the methodology outlined by Burchuladze et al (2014). The study uses panel data therefore two panel data models. That is random effects model and the fixed effects model are considered.

In order to choose which one of the two models is best to use a Breusch Pagan test is applied to test for the presence of random effects. If the results indicate random effects in the model a Hausman test is applied to select the best model to use. The variables are then regressed based on the model chosen.

3.5.1 The Fixed Effect Model

The fixed effect model takes the form

$$y_{it} = \propto + \beta_k F_{k,it} + \gamma_i M_{i,t} + u_{it}$$

Where

$\propto$ = Coefficient of regression

β_k = Unknown parameters (firm specific)

$F_{k,it}$ = Firm specific variables

$\gamma_i M_{i,t}$ = Macroeconomic variables

u_{it} = Error term

Firm specific variables are introduced in the model in order to control their effect on the capital structure.

In its simplest form fixed effects is a dummy variable model with one dummy variable included for each individual. The intercept is suppressed to avoid the dummy variable trap. The dummy variables estimation of the fixed effects model is a standard regression model shown as

$$y_{it} = \beta x_{it} + \mu_1 D_{1i} + \mu_2 D_{2i} + \cdots + \mu_N D_{Ni} + v_{it}$$

Where D_{1i} denotes a dummy variable that is equal to 1 for the first firm and 0 if otherwise and D_{2i} denotes a dummy variable that is equal to one for the first firm and 0 otherwise. This goes on until N where N is 20 since we are looking at 20 firms. This means that a lot of parameters need to be estimated since we are also looking into a period of 10 years therefore there is a huge loss in degrees of freedom.

3.5.2 The Breusch-Pagan test

This test is used to test for the presence of random effects. The Breusch-Pagan test statistic is

$$LM = \frac{NT}{2(T-1)}\left(\frac{\sum_{i=1}^{N}(\sum_{i=1}^{T} e^2 it)}{\sum_{i=1}^{N}\sum_{t=1}^{T} e^2 it} - 1\right)$$

If the null hypothesis $H_0: \delta^2{}_u = 0$ is true, then that means there is a presence of random effects.

3.5.3 Random effects model

The Random Effects model, which is equivalent to the Generalized Least Square (GLS), treats the heterogeneity across individuals as a random component. The equation used in the model is

$$y_{it} = \propto + \beta_k F_{k,it} + \gamma_j M_{i,t} + u_{it}$$

Where

$\propto$ = Coefficient of regression

β_k = Unknown parameters (firm specific)

$F_{k,it}$ = Firm specific variables

$\gamma_j M_{i,t}$ = Macroeconomic variables

u_{it} = Error term

The models parameters are estimated using generalized least squares. This estimation is carried out in strata the same way the fixed effect analysis is carried out.

3.5.4 The Hausman test

This test shall be used to differentiate between the fixed effects model and the random effects model in panel data. To run a Hausman test the fixed effects analysis is carried out first then saved in Stata then estimation of the random effects is carried out and saved in Stata and the Hausman test is run to compare the two.

The Hausman tests the null hypothesis that the unique errors (ui) are correlated with the regressors hence the preferred model is the random effects model. If the p-statistic is less than 0.05 the null hypothesis is rejected. The Hausman test statistic is

$$H = (b_1 - b_0)(Var\ (b_0)\ Var(b_1))(b_1 - b_0)$$

In order to test the hypothesis concerning whether there are similarities in the effects of the macroeconomic variables across the different segments, the companies are grouped into their different segments and the random effects model is applied in each segment.

3.5.5 Variable specification

Leverage (Dependent Variable)

The dependent variable that is used in this paper is leverage. Total debt ratio and Debt to Equity are the leverage ratios used.

Leverage ratio (DR) was measured as follow

Total debt ratio (TD) = Total liabilities/ Total assets.

Debt to equity= total liabilities/total equity

Independent variables

The following variables are selected due to prior research that had already identified them as variable that affect leverage.

Inflation rate

The annual change in consumer price index is used as the inflation rate for this paper

Interest rate

The 91 day treasury bill is used as a measure for interest rate. This is consistent with other related studies that consider it an effect of leverage.

GDP

The annual GDP Growth rate is used.

TABLE 1: Variables and their proxies

Table 1: Variables and their proxies

Variables	**Proxy measure**
Leverage ratio	Ratio of book value of total debt to total assets (Total debt ratio=Total debt/Total assets) Ratio of book value of long term debt to total assets Debt to equity=debt/common equity
Inflation	Annual change in consumer price index
Interest rate	91 day treasury bill rate
GDP	Annual rate of GDP growth
Exchange rate	KES/USD

The equations estimated include

EQUATION 1: OVERALL LEVERAGE

$$lev_{it} = \propto + \beta_1 GDP_{it} + \beta_2 INFL_{it} + \beta_3 INT_{it} + w_{it}$$

EQUATION 2: DEBT TO EQUITY

$$DE_{it} = \propto + \beta_1 GDP_{it} + \beta_2 INFL_{it} + \beta_3 INT_{it} + w_{it}$$

Where

lev_{it} = Total debt ratio

DE_{it} = Debt to equity ratio

$\propto$ = Coefficient of regression

β_i = Are the unknown parameters constant of regression

GDP_{it} = Annual GDP growth rate

$INFL_{it}$ = Annual inflation rate measured as changes in the consumer price index

INT_{it} = Interest rate

w_{it} = Is the error term (white noise)

CHAPTER FOUR

4. DATA ANALYSIS AND FINDINGS

4.1 INTRODUCTION

In conducting of the study a preference towards the use of logarithms is made because of the reduction in the fluctuations of the data. Acceptance or rejection of test results is based on a 5% level of significance, which is an assumption used throughout the analysis.

4.2 Unit root tests for stationarity

The Fisher type unit root test based on Augmented Dickey Fuller is used to test for stationary across the panels.

Testing the null hypothesis that all panels contain unit roots and the alternative hypothesis that at least one panel is stationary.

Table 2 below summarizes the results

Table 2: Stationary test summary

Variables	**p-value**
Debt to equity	0.0000
Total debt ratio	0.0000
Size	0.0000
Asset tangibility	0.0000
Inflation	0.0000
GDP	0.0000
Interest rate	0.0000
Exchange rate	1.0000

Based on the p-value (1.000) exchange rate is the only non-stationary variable since it is greater than 0.05. To solve for non- stationarity exchange rate is first differenced. The outputs are available in the appendix.

4.3 BREUSCH PAGAN TEST

The test helps decide between a random effects regression and a simple OLS regression. It also tests for heteroskedasticity. The null hypothesis is that variances across entities are zero, confirming the absence of a panel effect.

Table 3: Breusch Pagan Test

```
Breusch and Pagan Lagrangian multiplier test for random effects

        ltd[company,t] = Xb + u[company] + e[company,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+------------------------------
                     ltd |   .0760256       .2757274
                       e |   .0276337        .166234
                       u |   .0388015       .1969811

        Test:   Var(u) = 0
                             chibar2(01) =   824.85
                          Prob > chibar2 =   0.0000
```

Here the null hypothesis is rejected since the p value is less than 0.05 indicating heteroskedasticity. A random effects regression will be appropriate since a simple OLS regression cannot be run.

4.4 HAUSMAN TEST

To decide between fixed and random effects m

odel a Hausman test is carried out where the null hypothesis is that the unique errors (ui) are

Table 4: Hausman Test

correlated with the regressors hence the preferred model will be the random effects model.

	Coefficients			
	(b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
lsize	.0079495	-.0453518	.0533013	.028725
lassettan	-.006402	-.0389118	.0325097	.0157272
lgdp	.028213	.0287027	-.0004897	.
linflation	-.0187648	-.0174665	-.0012983	.
lday	.0943937	.0950792	-.0006856	.
dlexchange	-.6147592	-.6301107	.0153515	.

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 4.69
Prob>chi2 = 0.5844
(V_b-V_B is not positive definite)

Since the probability 0.5844 is greater than 0.05 we accept the null hypothesis meaning that the appropriate model to use is the random effects model.

4.5 The effect of macroeconomic factors on capital structure

4.5.1 Effect on Debt to Equity ratios

Table 5: Random Effect (Debt to Equity)

```
Random-effects GLS regression                   Number of obs      =       449
Group variable: company                         Number of groups   =        52

R-sq:  within  = 0.0053                         Obs per group: min =         3
       between = 0.1055                                        avg =       8.6
       overall = 0.0792                                        max =        11

                                                Wald chi2(6)       =      4.74
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.5779
```

lde	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lsize	-.0453518	.0593912	-0.76	0.445	-.1617564	.0710529
lassettan	-.0389118	.0447998	-0.87	0.385	-.1267178	.0488943
lgdp	.0287027	.0447439	0.64	0.521	-.0589937	.1163991
linflation	-.0174665	.092449	-0.19	0.850	-.1986633	.1637302
lday	.0950792	.0844848	1.13	0.260	-.0705079	.2606663
dlexchange	-.6301107	.5496486	-1.15	0.252	-1.707402	.4471808
_cons	-.0667709	.146139	-0.46	0.648	-.3531981	.2196562
sigma_u	.38819269					
sigma_e	.28476082					
rho	.65015132	(fraction of variance due to u_i)				

The table above presents the data findings of the random effect model with debt to equity as the dependent variable. According to the findings none of the variables have an effect on the debt to equity ratio because all of the p statistics are greater than 0.05 hence insignificant.

4.5.2 Effect on Total debt ratio

Table 6: Random Effect (Total Debt)

```
Random-effects GLS regression                   Number of obs      =       449
Group variable: company                         Number of groups   =        52

R-sq:  within  = 0.0049                         Obs per group: min =         3
       between = 0.1131                                        avg =       8.6
       overall = 0.0572                                        max =        11

                                                Wald chi2(6)       =      5.31
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.5049
```

ltd	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lsize	-.0350487	.0337079	-1.04	0.298	-.1011148	.0310175
lassettan	-.0238231	.0257521	-0.93	0.355	-.0742963	.0266501
lgdp	.0028961	.0261253	0.11	0.912	-.0483085	.0541007
linflation	-.0282176	.0538862	-0.52	0.601	-.1338326	.0773973
lday	.0523993	.049317	1.06	0.288	-.0442603	.1490588
dlexchange	-.358379	.3218936	-1.11	0.266	-.9892789	.2725208
_cons	-.3576904	.0836283	-4.28	0.000	-.521599	-.1937819
sigma_u	.19698105					
sigma_e	.16623402					
rho	.58405011	(fraction of variance due to u_i)				

The table above presents the data findings of the random effect model with total debt ratio as the dependent variable. According to the findings none of the dependent variables are significant in explaining the company's total debt ratio. This is because all of the p-values are greater than 0.05.

In conclusion the results prove that macroeconomic determinants do not affect the capital structure decisions of the listed firms.

4.6 Effects of macroeconomic factors on capital structures across different segments

In order to answer the second research question on whether there is a difference in the effects across the segments, the random effects model is ran on all the different companies according to the sectors they are based in.

4.6.1 AGRICULTURAL

This sector consists of the following firms; Kakuzi, Sasini, Rea Vipingo and Williamson Tea

Table 7: Agricultural (Debt to Equity)

```
Random-effects GLS regression                   Number of obs      =        42
Group variable: company                         Number of groups   =         4

R-sq:  within  = 0.1149                         Obs per group: min =         9
       between = 0.6410                                        avg =      10.5
       overall = 0.3371                                        max =        11

                                                Wald chi2(6)       =     17.80
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0068
```

lde	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lsize	.7029501	.193872	3.63	0.000	.3229679	1.082932
lassettan	.7654824	.2753609	2.78	0.005	.225785	1.30518
lgdp	-.0990595	.1461953	-0.68	0.498	-.3855969	.187478
linflation	-.3100867	.2923492	-1.06	0.289	-.8830807	.2629073
lday	.1489176	.2532126	0.59	0.556	-.34737	.6452053
dlexchange	-1.519054	1.757424	-0.86	0.387	-4.963543	1.925434
_cons	.6419157	.4439904	1.45	0.148	-.2282894	1.512121
sigma_u	0					
sigma_e	.2362467					
rho	0	(fraction of variance due to u_i)				

According to the results size and asset tangibility are the dependent variables that affect the debt to equity ratios of the agricultural firms. The p value for size is 0.000 and the p value for asset tangibility is 0.005. They are both less than 0.05 therefore they are significant. An increase in size and asset tangibility by one unit leads to a 0.703 and 0.765 increase in the debt to equity ratio.

Table 8: Agricultural (Total Debt)

```
Random-effects GLS regression                   Number of obs      =        42
Group variable: company                         Number of groups   =         4

R-sq:  within  = 0.2576                         Obs per group: min =         9
       between = 0.4062                                        avg =      10.5
       overall = 0.3223                                        max =        11

                                                Wald chi2(6)       =     16.65
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0107
```

ltd	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lsize	.2809101	.0765399	3.67	0.000	.1308947	.4309254
lassettan	.2268367	.1087113	2.09	0.037	.0137664	.4399069
lgdp	-.0399242	.0577173	-0.69	0.489	-.153048	.0731995
linflation	.0352413	.1154182	0.31	0.760	-.1909742	.2614569
lday	-.1207305	.0999673	-1.21	0.227	-.3166627	.0752018
dlexchange	-.0602972	.6938236	-0.09	0.931	-1.420166	1.299572
_cons	-.1972446	.1752855	-1.13	0.260	-.5407979	.1463087
sigma_u	0					
sigma_e	.08987956					
rho	0	(fraction of variance due to u_i)				

According to the results size and asset tangibility affect total debt ratio. The p values are 0.000 and 0.037 respectively. The p values are less than 0.05 showing statistical significance. An increase in size by one unit leads to a 0.281 increase in total debt and an increase in asset tangibility by one-unit leads to a 0.227 increase in total debt. None of the macroeconomic determinants are significant.

4.6.2 AUTOMOBILES & ACCESSORIES

This sector consists of Car & General, Sameer and Marshalls (E.A.) Ltd

Table 9: Automobiles (Debt to equity)

```
Random-effects GLS regression                   Number of obs      =        30
Group variable: company                         Number of groups   =         3

R-sq:  within  = 0.4316                         Obs per group: min =         8
       between = 0.5584                                        avg =      10.0
       overall = 0.3468                                        max =        11

                                                Wald chi2(6)       =     12.21
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0574
```

lde	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lsize	.2262795	.0979303	2.31	0.021	.0343396	.4182194
lassettan	.0724062	.2859692	0.25	0.800	-.4880831	.6328956
lgdp	.1241328	.1406269	0.88	0.377	-.1514909	.3997566
linflation	.0240886	.339801	0.07	0.943	-.6419093	.6900864
lday	.2030241	.2674758	0.76	0.448	-.3212189	.7272671
dlexchange	-2.907348	1.777394	-1.64	0.102	-6.390976	.5762814
_cons	-.2819413	.5263077	-0.54	0.592	-1.313485	.7496028
sigma_u	0					
sigma_e	.14309428					
rho	0	(fraction of variance due to u_i)				

The above results state that size is significant in explaining the debt to equity ratios. Its p value is less than 0.05. A unit increase in size will lead to a 0.2263 increase in the debt to equity ratio.

Table 10: Automobiles (Total Debt)

```
Random-effects GLS regression                   Number of obs      =        30
Group variable: company                         Number of groups   =         3

R-sq:  within  = 0.2532                         Obs per group: min =         8
       between = 0.6591                                        avg =      10.0
       overall = 0.2747                                        max =        11

                                                Wald chi2(6)       =      8.71
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.1906
```

ltd	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lsize	.1087097	.0568072	1.91	0.056	-.0026305	.2200498
lassettan	-.0196294	.1658845	-0.12	0.906	-.344757	.3054983
lgdp	.0740056	.0815746	0.91	0.364	-.0858778	.2338889
linflation	.0688357	.1971112	0.35	0.727	-.3174951	.4551665
lday	.1060048	.1551569	0.68	0.494	-.1980972	.4101067
dlexchange	-1.5136	1.031028	-1.47	0.142	-3.534378	.507177
_cons	-.567708	.3052996	-1.86	0.063	-1.166084	.0306682
sigma_u	0					
sigma_e	.09744028					
rho	0	(fraction of variance due to u_i)				

According to the results none of the macroeconomic and firm specific variables affect the total debt ratio.

In general the automobiles sectors considers only size in making capital structure decisions.

4.6.3 BANKING

The companies that we look into in this sector are; CFC Stanbic Holdings, I&M, DTB, Housing Finance, Kenya Commercial Bank, National Bank of Kenya, NIC Bank, Standard Chartered Bank, Equity Bank and The Co-operative Bank of Kenya.

Banking (Debt to Equity)

Table 11: Banking (Debt to Equity)

```
. xtreg lde lsize lassettan lgdp linflation lday dlexchange, re

Random-effects GLS regression                   Number of obs      =        85
Group variable: company                         Number of groups   =        10

R-sq:  within  = 0.0476                         Obs per group: min =         3
       between = 0.0362                                        avg =       8.5
       overall = 0.0008                                        max =        11

                                                Wald chi2(6)       =      2.79
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.8347
```

lde	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lsize	-.2315952	.1881567	-1.23	0.218	-.6003756	.1371852
lassettan	.289693	.2101458	1.38	0.168	-.1221852	.7015712
lgdp	.0336048	.122866	0.27	0.784	-.2072081	.2744177
linflation	.0874938	.2589429	0.34	0.735	-.420025	.5950127
lday	.0186925	.2461864	0.08	0.939	-.4638241	.501209
dlexchange	-.2673213	1.507165	-0.18	0.859	-3.221311	2.686668
_cons	.4810819	.449786	1.07	0.285	-.4004825	1.362646
sigma_u	.38623089					
sigma_e	.32946521					
rho	.5788195	(fraction of variance due to u_i)				

According to the results none of the variables are statistically significant in explaining the debt to equity ratio. All the p-values are greater than 0.05.

Table 12: Banking (Total Debt)

```
Random-effects GLS regression                   Number of obs      =        85
Group variable: company                         Number of groups   =        10

R-sq:  within  = 0.1097                         Obs per group: min =         3
       between = 0.0424                                        avg =       8.5
       overall = 0.0320                                        max =        11

                                                Wald chi2(6)       =      6.97
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.3237
```

ltd	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lsize	-.0194726	.051726	-0.38	0.707	-.1208537	.0819085
lassettan	.0887666	.0572239	1.55	0.121	-.0233902	.2009235
lgdp	-.0268544	.0351795	-0.76	0.445	-.0958049	.0420961
linflation	-.1115223	.0738247	-1.51	0.131	-.256216	.0331715
lday	.1358162	.069845	1.94	0.052	-.0010775	.2727098
dlexchange	-.3904083	.4311161	-0.91	0.365	-1.23538	.4545638
_cons	.014788	.1210174	0.12	0.903	-.2224016	.2519777
sigma_u	.07937292					
sigma_e	.097119					
rho	.40045744	(fraction of variance due to u_i)				

The above results show that none of the variables are statistically significant in explaining the total debt ratio. All the p-values are less than 0.05

4.6.4 COMMERCIAL & SERVICES

The companies analysed are; Express Ltd, Kenya Airways, Nation Media Group, Standard Group, TPS Eastern Africa, Scangroup and Uchumi Supermarket.

Table 13:Commercial & Services (Debt to Equity)

```
Random-effects GLS regression                   Number of obs      =        52
Group variable: company                         Number of groups   =         6

R-sq:  within  = 0.2400                         Obs per group: min =         6
       between = 0.9596                                        avg =       8.7
       overall = 0.7574                                        max =        11

                                                Wald chi2(6)       =    140.51
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000
```

lde	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lsize	-1.200893	.1068582	-11.24	0.000	-1.410332	-.9914553
lassettan	.4696713	.0936275	5.02	0.000	.2861647	.6531779
lgdp	.3164003	.1546421	2.05	0.041	.0133073	.6194934
linflation	.6299608	.2975284	2.12	0.034	.0468158	1.213106
lday	-.5429655	.2464274	-2.20	0.028	-1.025954	-.0599767
dlexchange	1.358187	1.871295	0.73	0.468	-2.309485	5.025858
_cons	-.1192618	.4394756	-0.27	0.786	-.9806182	.7420945
sigma_u	0					
sigma_e	.28786561					
rho	0	(fraction of variance due to u_i)				

The results above show that size, asset Tangibility, interest rates and inflation affect the debt to equity ratio of Commercial and Services companies. All their p-values are less than 0.05.

Therefore a unit increase in asset tangibility will lead to a 0.4697 increase in debt to equity ratio. A unit increase in interest rate will lead to a 0.543decrease in debt to equity ratio. A unit increase in inflation will lead to a 0.63 increase in debt to equity ratio and a unit increase in size will lead to a 1.201 decrease in debt to equity ratio.

Table 14: Commercial & Services (Total Debt)

```
Random-effects GLS regression                   Number of obs      =        53
Group variable: company                         Number of groups   =         6

R-sq:  within  = 0.0628                         Obs per group: min =         6
       between = 0.8989                                        avg =       8.8
       overall = 0.3810                                        max =        11

                                                Wald chi2(6)       =     28.32
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0001
```

ltd	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lsize	-.4801044	.0940215	-5.11	0.000	-.6643831	-.2958257
lassettan	.2637781	.0830461	3.18	0.001	.1010107	.4265455
lgdp	.1194423	.1360801	0.88	0.380	-.1472698	.3861544
linflation	.3095166	.2593754	1.19	0.233	-.1988499	.8178831
lday	-.2223868	.2185559	-1.02	0.309	-.6507485	.2059748
dlexchange	.9689223	1.656711	0.58	0.559	-2.278172	4.216017
_cons	-.3780651	.3871777	-0.98	0.329	-1.136919	.3807892
sigma_u	0					
sigma_e	.27905126					
rho	0	(fraction of variance due to u_i)				

The results above show that size and asset tangibility affect the total debt ratio. The p-values are 0.000 and 0.001 respectively. A unit increase in asset tangibility will lead to a 0.2638 increase in total debt ratio. A unit increase in size will lead to a 0.48 decrease in total debt.

In conclusion Commercial & Service industries take into consideration size, asset tangibility, inflation and interest rates in making their capital structure decisions.

4.6.5 CONSTRUCTION & ALLIED

The companies selected include; Athi River Mining, Bamburi Cement, Crown Berger Ltd, E.A. Cables Ltd and E.A. Portland Cement Ltd.

Table 15: Construction & Allied (Debt to Equity)

```
Random-effects GLS regression                   Number of obs      =        47
Group variable: company                         Number of groups   =         5

R-sq:  within  = 0.1175                         Obs per group: min =         3
       between = 0.7738                                        avg =       9.4
       overall = 0.4721                                        max =        11

                                                Wald chi2(6)       =     20.14
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0026
```

lde	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lsize	-.5634709	.1485323	-3.79	0.000	-.8545889	-.2723529
lassettan	-.9475571	.2994178	-3.16	0.002	-1.534405	-.360709
lgdp	-.083672	.0877127	-0.95	0.340	-.2555858	.0882417
linflation	-.2242362	.1771936	-1.27	0.206	-.5715293	.1230568
lday	.3540108	.1563791	2.26	0.024	.0475135	.6605082
dlexchange	-1.20025	1.086049	-1.11	0.269	-3.328867	.9283675
_cons	-.48183	.2893837	-1.67	0.096	-1.049012	.0853517
sigma_u	.03670657					
sigma_e	.11009291					
rho	.10004383	(fraction of variance due to u_i)				

According to the results size, asset tangibility and interest rates are significant in explaining debt to equity. The p-values are 0.000, 0.002 and 0.024 respectively. They are all less than 0.05. A unit increase in size will lead to a 0.5635 decrease in debt to equity ratio. A unit increase in asset tangibility will lead to a 0.9476 decrease in debt to equity ratio. A unit increase in interest rate will lead to a 0.354 increase in debt to equity ratio.

Table 16: Construction & Allied (Total Debt)

```
Random-effects GLS regression                   Number of obs      =        47
Group variable: company                         Number of groups   =         5

R-sq:  within  = 0.0964                         Obs per group: min =         3
       between = 0.8247                                        avg =       9.4
       overall = 0.4519                                        max =        11

                                                Wald chi2(6)       =     19.45
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0035
```

ltd	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lsize	-.2804792	.0767021	-3.66	0.000	-.4308126	-.1301459
lassettan	-.5340663	.1559778	-3.42	0.001	-.8397772	-.2283554
lgdp	-.0734262	.0469217	-1.56	0.118	-.165391	.0185387
linflation	-.1411481	.0946003	-1.49	0.136	-.3265612	.0442651
lday	.1642672	.0834549	1.97	0.049	.0006986	.3278357
dlexchange	-.5842395	.5804916	-1.01	0.314	-1.721982	.5535032
_cons	-.523724	.1536269	-3.41	0.001	-.8248271	-.2226208
sigma_u	.01556503					
sigma_e	.05375396					
rho	.07735916	(fraction of variance due to u_i)				

According to the table size and asset tangibility are significant in explaining total debt. The p values are 0.000 and 0.001 respectively. Since they are less than 0.05 they are significant. A unit increase in size and asset tangibility leads to a 0.2805 and a 0.5341 decrease in total debt ratio respectively.

In conclusion size, asset tangibility and interest rates are essential in making capital structure decisions for companies in the construction and allied industry.

4.6.6 ENERGY & PETROLEUM

The companies tested include; Kenolkobil, Total Kenya, Kengen and KPLC.

Table 17: Energy & Petroleum (Debt to Equity)

```
Random-effects GLS regression                   Number of obs      =        40
Group variable: company                         Number of groups   =         4

R-sq:  within  = 0.2820                         Obs per group: min =         7
       between = 0.9944                                        avg =      10.0
       overall = 0.5231                                        max =        11

                                                Wald chi2(6)       =     36.19
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000
```

lde	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lsize	.2798337	.0590305	4.74	0.000	.164136	.3955313
lassettan	-.4384224	.1178949	-3.72	0.000	-.6694922	-.2073526
lgdp	.0827678	.0800647	1.03	0.301	-.0741561	.2396917
linflation	-.1113049	.1668003	-0.67	0.505	-.4382275	.2156176
lday	.2769955	.1487656	1.86	0.063	-.0145796	.5685707
dlexchange	-2.100059	.9867186	-2.13	0.033	-4.033992	-.1661265
_cons	-.4045244	.2581784	-1.57	0.117	-.9105449	.101496
sigma_u	0					
sigma_e	.13622415					
rho	0	(fraction of variance due to u_i)				

According to the results size, asset tangibility and exchange rate are the only variables statistically significant in explaining the debt to equity ratio of the companies. The p-values are 0.000, 0.000 and 0.033 respectively. They are less than 0.05 proving significance. A unit increase in size leads to 0.28 increase in debt to equity ratio while a unit increase in asset tangibility leads to a 0.44 decrease in debt to equity ratio. A unit increase in exchange rate leads to a 2.1 decrease in debt to equity ratio.

Table 18: Energy & Petroleum (Total Debt)

```
Random-effects GLS regression                   Number of obs      =        40
Group variable: company                         Number of groups   =         4

R-sq:  within  = 0.3478                         Obs per group: min =         7
       between = 0.9984                                        avg =      10.0
       overall = 0.5383                                        max =        11

                                                Wald chi2(6)       =     38.47
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000
```

ltd	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lsize	.1169447	.0260694	4.49	0.000	.0658497	.1680398
lassettan	-.1650127	.0520655	-3.17	0.002	-.2670591	-.0629662
lgdp	.0219135	.0353586	0.62	0.535	-.0473882	.0912152
linflation	-.0837936	.0736633	-1.14	0.255	-.2281711	.0605838
lday	.1573594	.0656987	2.40	0.017	.0285922	.2861265
dlexchange	-1.203398	.4357605	-2.76	0.006	-2.057473	-.3493235
_cons	-.4550391	.1140183	-3.99	0.000	-.6785108	-.2315673
sigma_u	0					
sigma_e	.05834438					
rho	0	(fraction of variance due to u_i)				

According to the table size, asset tangibility, interest rates and exchange rates are statistically significant in determining since their p-valuesare all less than 0.05. A unit increase in size leads to a 0.117 increase in total debt ratio and a unit increase in asset tangibility leads to a 0.165 decrease in total debt ratio. A unit increase in interest rate leads to a 0.1574 increase in total debt ratio. A unit increase in exchange rate leads to a 1.2034 decrease in total debt ratio.

In conclusion size, asset tangibility, exchange rate and interest rates are significant determinants of capital structure decisions.

4.6.7 INSURANCE

The companies tested include; Jubilee, Pan Africa, Kenya Re-Insurance, Liberty Kenya Holdings, British-American Investments Company and CIC Insurance Group Ltd.

Table 19: Insurance (Debt to Equity)

```
Random-effects GLS regression                   Number of obs      =        48
Group variable: company                         Number of groups   =         6

R-sq:  within  = 0.1384                         Obs per group: min =         3
       between = 0.2036                                        avg =       8.0
       overall = 0.2578                                        max =        11

                                                Wald chi2(6)       =     14.24
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0270
```

lde	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lsize	-1.375358	.4364989	-3.15	0.002	-2.23088	-.5198362
lassettan	.2320747	.1715936	1.35	0.176	-.1042426	.568392
lgdp	.0809425	.3305948	0.24	0.807	-.5670114	.7288965
linflation	-.5831913	.6586757	-0.89	0.376	-1.874172	.7077894
lday	.1157402	.6728575	0.17	0.863	-1.203036	1.434517
dlexchange	-1.512677	3.917031	-0.39	0.699	-9.189916	6.164562
_cons	-.089994	.906486	-0.10	0.921	-1.866674	1.686686
sigma_u	0					
sigma_e	.35379706					
rho	0	(fraction of variance due to u_i)				

According to the above size affects the debt to equity ratios of insurance companies. Since its p-value (0.002) is less than 0.05. A unit increase in size leads to a 1.3754 decrease in debt to equity ratio.

Table 20: Insurance (Total Debt)

```
Random-effects GLS regression                   Number of obs      =        48
Group variable: company                         Number of groups   =         6

R-sq:  within  = 0.1780                         Obs per group: min =         3
       between = 0.3232                                        avg =       8.0
       overall = 0.3613                                        max =        11

                                                Wald chi2(6)       =     23.19
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0007
```

ltd	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lsize	-1.12092	.2786784	-4.02	0.000	-1.66712	-.5747206
lassettan	.1714088	.1095523	1.56	0.118	-.0433096	.3861273
lgdp	.1200513	.211065	0.57	0.570	-.2936286	.5337311
linflation	-.3552332	.4205251	-0.84	0.398	-1.179447	.4689809
lday	.1836901	.4295793	0.43	0.669	-.6582699	1.02565
dlexchange	-1.315931	2.50079	-0.53	0.599	-6.217389	3.585528
_cons	-.6951308	.5787371	-1.20	0.230	-1.829435	.4391731
sigma_u	0					
sigma_e	.27081103					
rho	0	(fraction of variance due to u_i)				

According to the above size is the only variable among the variables tested that affects total debt ratio. Its p-value is 0.000 proving significance at a 0.05 confidence level. A unit increase in size will lead to a 1.121 decrease in total debt ratio.

4.6.8 INVESTMENT

The companies tested include; Olympia Capital Holdings, Centum Investment Co Ltd and Trans Century.

Table 21: Investment (Debt to Equity)

```
Random-effects GLS regression                   Number of obs      =        18
Group variable: company                         Number of groups   =         3

R-sq:  within  = 0.4893                         Obs per group: min =         3
       between = 0.0140                                        avg =       6.0
       overall = 0.3397                                        max =         8

                                                Wald chi2(6)       =      5.66
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.4624
```

lde	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lsize	.3492427	.4948182	0.71	0.480	-.6205831	1.319068
lassettan	-.5698175	.4020584	-1.42	0.156	-1.357837	.2182025
lgdp	.2382378	.2483206	0.96	0.337	-.2484617	.7249372
linflation	.2818735	.5455689	0.52	0.605	-.7874219	1.351169
lday	.0828364	.5023965	0.16	0.869	-.9018426	1.067515
dlexchange	1.61574	3.347101	0.48	0.629	-4.944456	8.175937
_cons	-.6770945	.8040315	-0.84	0.400	-2.252967	.8987783
sigma_u	0					
sigma_e	.23311259					
rho	0	(fraction of variance due to u_i)				

According to the above none of the variables affect debt to equity ratios. Since all the p-values are greater than 0.05.

Table 22: Investment (Total Debt)

```
Random-effects GLS regression                   Number of obs      =        17
Group variable: company                         Number of groups   =         3

R-sq:  within  = 0.2540                         Obs per group: min =         3
       between = 0.0132                                        avg =       5.7
       overall = 0.1414                                        max =         8

                                                Wald chi2(6)       =      1.65
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.9491
```

ltd	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lsize	.1912443	.2746071	0.70	0.486	-.3469758	.7294645
lassettan	-.1403764	.2298815	-0.61	0.541	-.5909358	.3101831
lgdp	.0486567	.138301	0.35	0.725	-.2224084	.3197217
linflation	-.0004326	.3067865	-0.00	0.999	-.6017231	.6008579
lday	.124471	.2816096	0.44	0.658	-.4274737	.6764157
dlexchange	.7355062	1.994054	0.37	0.712	-3.172768	4.64378
_cons	-.501352	.4460359	-1.12	0.261	-1.375566	.3728623
sigma_u	0					
sigma_e	.0892814					
rho	0	(fraction of variance due to u_i)				

According to the table none of the variables affect total debt ratios. All the p-values are greater than 0.05.

In conclusion none of the variables are significant determinants of capital structure in the investment segment.

4.6.9 MANUFACTURING AND ALLIED

The companies tested include; B.O.C Kenya, British American Tobacco, Carbacid Investment, East African Breweries, Mumias Sugar, Unga Group, Eveready East Africa, Kenya Orchards and A. Baumann.

Table 23: Manufacturing & Allied (Debt to Equity)

```
. xtreg lde lsize lassettan lgdp linflation lday dlexchange, re

Random-effects GLS regression                   Number of obs      =        66
Group variable: company                         Number of groups   =         9

R-sq:  within  = 0.0988                         Obs per group: min =         4
       between = 0.2312                                        avg =       7.3
       overall = 0.0032                                        max =         9

                                                Wald chi2(6)       =      5.08
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.5335
```

lde	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lsize	.0601507	.1004289	0.60	0.549	-.1366864	.2569877
lassettan	.1693792	.0796504	2.13	0.033	.0132673	.3254911
lgdp	.0472074	.0811898	0.58	0.561	-.1119217	.2063365
linflation	.0420913	.1733036	0.24	0.808	-.2975776	.3817602
lday	-.0104027	.1867332	-0.06	0.956	-.376393	.3555876
dlexchange	-.51501	1.008253	-0.51	0.609	-2.49115	1.46113
_cons	-.0881337	.2902354	-0.30	0.761	-.6569847	.4807172
sigma_u	.41288904					
sigma_e	.21371861					
rho	.78868836	(fraction of variance due to u_i)				

Asset tangibility is a significant variable since its p-value (0.033) is less than 0.05. According to the table a unit increase in asset tangibility will lead to a 0.1694 increase in debt to equity ratio.

Table 24: Manufacturing & Allied (Total Debt)

Random-effects GLS regression — Number of obs = 66
Group variable: company — Number of groups = 9

R-sq: within = 0.1348 — Obs per group: min = 4
between = 0.0746 — avg = 7.3
overall = 0.0007 — max = 9

Wald chi2(6) = 8.08
corr(u_i, X) = 0 (assumed) — Prob > chi2 = 0.2320

ltd	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lsize	.0221895	.0491034	0.45	0.651	-.0740514	.1184304
lassettan	.1036817	.0387304	2.68	0.007	.0277715	.179592
lgdp	-.0077851	.0392825	-0.20	0.843	-.0847774	.0692072
linflation	-.0399306	.0838538	-0.48	0.634	-.2042811	.1244198
lday	-.0725388	.090457	-0.80	0.423	-.2498314	.1047537
dlexchange	-.1317699	.4877967	-0.27	0.787	-1.087834	.8242941
_cons	-.213228	.1603803	-1.33	0.184	-.5275675	.1011116
sigma_u	.31184577					
sigma_e	.10373054					
rho	.90037734	(fraction of variance due to u_i)				

According to the above asset tangibility is statistically significant due to the fact that its p-value (0.007) is less than 0.05. A unit increase in asset tangibility will lead to a 0.1037 increase in total debt ratio. Therefore manufacturing and allied companies take asset tangibility as a determinant of their capital structure decisions. They do not consider any macroeconomic variables, as they are statistically insignificant.

Table 25: Summary table on the significant factors affecting capital structure effect across segments

Sector	Debt to Equity	Total debt	DE&TD
Agricultural	Size & Asset, tangibility	Size & Asset, Tangibility	Size & Asset, Tangibility
Automobiles & Accessories	Size	–	Size
Banking	–	-	-
Commercial & Services	Size, Asset tangibility, Interest rates & Inflation	Size & Asset tangibility	Size, Asset tangibility, Interest rates & Inflation
Construction & Allied	Size, Asset tangibility & Interest rate	Size & Asset tangibility	Size, Asset tangibility & Interest rate
Energy & Petroleum	Size, Asset tangibility & Exchange rate	Size, Asset tangibility, Interest rates & Exchange rate	Size, Asset tangibility, Interest rates & Exchange rates.
Insurance	Size	Size	Size
Investment	None	None	None
Manufacturing & Allied	Asset tangibility	Asset tangibility	

CHAPTER FIVE

5. DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Discussions

5.1.1 Effect of macroeconomic factors on capital structure decisions of listed firms in Kenya

The findings indicate that macroeconomic determinants do not have any effect on the capital structure decisions of listed firms in Kenya. These results differ from Burchuladze (2014) He applied the random effects model to investigate the effect of macroeconomic factors on capital structure of Swedish firms from the year 2002 to 2012. His findings were that GDP growth rate, inflation, banking loan to non-financial private sector % GDP and interest rate are the significant macroeconomic variables and stock price performance ratio was the only significant firm specific variable. A reason for the differing results is the difference in sample sets. The Swedish research is carried out in a developed country while Kenya is developing.

These findings also differ from Muthama (2013) who analyzed the macroeconomic influences on corporate capital structure of listed companies in Kenya. His results found that GDP growth rate; interest and inflation had an effect on capital structure decisions. His results differ from this paper. A reason for the differing results may be the methodologies used. His paper applied a multi linear time series regression methodology while the methodology applied in this paper is a random effects panel data model.

The findings also differ from Gajurel (2005) who looked into the macroeconomic determinants of a firm's capital structure and found that; inflation, interest rate and GDP are the significant variables. The difference in the studies is the sample set and methodology used. He looked into US firms and used a multi linear regression panel data model. Therefore leading to differing results.

5.1.2 Difference in the effects of these macroeconomic factors across different segments

The results from this research accept the null hypothesis that there are no similarities in the effects of macroeconomic factors across the segments.

Commercial, construction and energy are the only segments that are affected by macroeconomic variables. The other segments are either only affected by firm specific variables such as agriculture, automobile, insurance and manufacturing or not affected by either macroeconomic or firm specific variables such as banking and investment.

Commercial & Services are affected by size, asset tangibility, interest and inflation. The relationship between interest and debt to equity ratio is negative. These results are the same as Muthama (2013) who found that an increase in interest rate leads to a decrease in short term debt and long term debt ratios. Burchuladze (2014) also found an inverse relationship between debt to equity ratio and interest rate. This results are the same with Singh (1993) where he found that an increase in interest rate lead to a decrease in debt in the long run. These results differ from Bokpin (2009) who found that a positive relationship exists. This is because companies will prefer to issue equity than debt since equity is less expensive.

An increase in inflation leads to an increase in the debt to equity ratio for commercial and services companies. These results are consistent with Hanousek & Shamshur (2011) and Burchuladze (2014) paper where leverage is positively related with inflation. These results contradict with Muthama (2013)and Gajurel (2005)who find that an increase in inflation has a negative effect on leverage. These results could be explained by the fact that an increase in inflation will lead to companies' preferring debt to equity. Since the issuing of equity is more expensive than having debt.

In the energy and petroleum industry size, asset tangibility, interest rate and exchange rate are determinants of capital structure. An increase in exchange rate leads to a decrease in debt to equity ratio and total debt ratio. These results contradict with Burchuladze (2014) results where he found that the exchange rates are not significant. A decrease in debt ratio due to an increase in exchange rate can be explained by the fact that a decrease in the exchange rate will make imports more expensive. Petroleum industries import petrol because it is not produced locally therefore a

decrease in exchange rate makes it more expensive to import and a company has less incentive to take on debt which will lead to an increase in costs that the company needs to deal with. This is an exchange rate risk that companies should hedge against.

An increase in interest rate leads to an increase in total debt ratio. These results are consistent with Muthama (2013) and Burchuladze (2014) also finds a positive relationship between interest rates and total debt ratio. They differ from Dincergok & Yalciner (2011) who found a negative relationship between interest and leverage. This is because higher economic growth caused by an increase in interest rate leads to firms preferring long-term debt ratios to short term debt ratios.

GDP is insignificant in determining capital structure. These results contradict with Muthama (2013) where he finds a negative relationship between GDP and long-term debt and short-term debt ratios. Burchuladze (2014) finds that GDP is positively related to debt to equity, debt to capital and debt to assets ratios. The results are consistent with Perera (2013) who found an insignificant relationship between GDP and capital structure.

5.2 Conclusions and Recommendations

From the findings of this study the financial managers in different companies should take into consideration the macroeconomic determinants of their capital structure decisions. This is especially if the managers are in companies located in the commercial, construction and energy industries as these are the industries whose capital structure are affected by macroeconomic factors as shown in the results of this study.

Due to the limitations of sourcing for secondary data needed for this paper, more initiative should be taken by the NSE to ensure that each company prepares their financial statements every year and makes them easily available to the public. They should also be encouraged to make available all past annual financial statements and provide them on their online platforms. If all the annual statements are available the research would be much easier and time efficient and the problem of unbalanced panel data in the model will be solved.

Burchuladze (2014) studies 233 firms using the random effects model. This same model is used in this paper but with a sample consisting of 55 firms. The results on the general effect of macroeconomic determinants on all the firms together are insignificant and this maybe due to the noise caused by the small sample set used. Further research studies should look into better panel data models that can accommodate small sample sizes and draw significant results.

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APPENDIX 1 OUTPUT OF THE DEBT TO EQUITY STATIONARITY

```
Ho: All panels contain unit roots          Number of panels      =     53
Ha: At least one panel is stationary       Avg. number of periods =   9.08

AR parameter: Panel-specific               Asymptotics: T -> Infinity
Panel means:  Included
Time trend:   Not included
Drift term:   Not included                 ADF regressions: 0 lags
```

		Statistic	p-value
Inverse chi-squared(106)	P	212.1862	0.0000
Inverse normal	Z	-0.4516	0.3258
Inverse logit t(244)	L*	-3.3042	0.0005
Modified inv. chi-squared	Pm	7.2929	0.0000

P statistic requires number of panels to be finite.
Other statistics are suitable for finite or infinite number of panels.

Here we reject the null hypothesis that there is unit roots based on the p statistic being less than 0.05.

APPENDIX 2: OUTPUT OF FISHER TEST FOR EXCHANGE RATE

Fisher-type unit-root test for lexchange
Based on augmented Dickey-Fuller tests

Ho: All panels contain unit roots — Number of panels = 53
Ha: At least one panel is stationary — Number of periods = 11

AR parameter: Panel-specific — Asymptotics: T -> Infinity
Panel means: Included
Time trend: Not included
Drift term: Not included — ADF regressions: 0 lags

		Statistic	p-value
Inverse chi-squared(106)	P	15.9344	1.0000
Inverse normal	Z	7.8789	1.0000
Inverse logit t(269)	L*	7.3141	1.0000
Modified inv. chi-squared	Pm	-6.1857	1.0000

P statistic requires number of panels to be finite.
Other statistics are suitable for finite or infinite number of panels.

The p-values are all greater than 0.05 therefore the null hypothesis is accepted that there is presence of unit root.

APPENDIX 3: OUTPUT OF FISHER TEST FOR FIRST DIFFERENCED EXCHANGE RATES

Fisher-type unit-root test for dlexchange
Based on augmented Dickey-Fuller tests

Ho: All panels contain unit roots — Number of panels = 53
Ha: At least one panel is stationary — Number of periods = 11

AR parameter: Panel-specific — Asymptotics: T -> Infinity
Panel means: Included
Time trend: Not included
Drift term: Not included — ADF regressions: 0 lags

		Statistic	p-value
Inverse chi-squared(106)	P	224.5408	0.0000
Inverse normal	Z	-8.5455	0.0000
Inverse logit t(269)	L*	-8.0031	0.0000
Modified inv. chi-squared	Pm	8.1414	0.0000

P statistic requires number of panels to be finite.
Other statistics are suitable for finite or infinite number of panels.

The p values are less than 0.05. Reject the null hypothesis that unit root is present.

APPENDIX 4: OUTPUT OF THE FISHER TEST FOR TOTAL DEBT

Fisher-type unit-root test for ltd
Based on augmented Dickey-Fuller tests

Ho: All panels contain unit roots		Number of panels	= 53
Ha: At least one panel is stationary		Avg. number of periods	= 9.51
AR parameter: Panel-specific		Asymptotics: T -> Infinity	
Panel means: Included			
Time trend: Not included			
Drift term: Not included		ADF regressions: 0 lags	

		Statistic	p-value
Inverse chi-squared(106)	P	160.6264	0.0005
Inverse normal	Z	-1.6590	0.0486
Inverse logit t(259)	L*	-2.1871	0.0148
Modified inv. chi-squared	Pm	3.7518	0.0001

P statistic requires number of panels to be finite.
Other statistics are suitable for finite or infinite number of panels.

The p-values are less than 0.05 therefore the null hypothesis is rejected that unit root is present.

APPENDIX 5: OUTPUT OF FISHER TEST FOR SIZE

```
Fisher-type unit-root test for lsize
Based on augmented Dickey-Fuller tests
```

Ho: All panels contain unit roots		Number of panels	= 53
Ha: At least one panel is stationary		Avg. number of periods	= 8.68
AR parameter: Panel-specific		Asymptotics: T -> Infinity	
Panel means: Included			
Time trend: Not included			
Drift term: Not included		ADF regressions: 0 lags	

		Statistic	p-value
Inverse chi-squared(106)	P	272.1917	0.0000
Inverse normal	Z	-4.9311	0.0000
Inverse logit t(249)	L*	-7.7193	0.0000
Modified inv. chi-squared	Pm	11.4141	0.0000

P statistic requires number of panels to be finite.
Other statistics are suitable for finite or infinite number of panels.

The p values are less than 0.05 therefore size is stationary. Reject the null hypothesis

APPENDIX 6: OUTPUT OF FISHER TEST FOR ASSET TANGIBILITY

```
Fisher-type unit-root test for lassettan
Based on augmented Dickey-Fuller tests
------------------------------------------------------------------------------
Ho: All panels contain unit roots          Number of panels      =     52
Ha: At least one panel is stationary       Avg. number of periods =   8.71

AR parameter: Panel-specific               Asymptotics: T -> Infinity
Panel means:  Included
Time trend:   Not included
Drift term:   Not included                 ADF regressions: 0 lags
------------------------------------------------------------------------------
                                  Statistic      p-value
------------------------------------------------------------------------------
Inverse chi-squared(104)  P       183.4512       0.0000
Inverse normal            Z        -1.8502       0.0321
Inverse logit t(244)      L*       -3.6290       0.0002
Modified inv. chi-squared Pm        5.5090       0.0000
------------------------------------------------------------------------------
P statistic requires number of panels to be finite.
Other statistics are suitable for finite or infinite number of panels.
------------------------------------------------------------------------------
```

The p-values are less than 0.05 therefore asset tangibility is stationary. The null hypothesis is rejec

APPENDIX 7: OUTPUT OF FISHER TEST FOR INTEREST RATES

Fisher-type unit-root test for **lday**
Based on augmented Dickey-Fuller tests

Ho: All panels contain unit roots	Number of panels = 53
Ha: At least one panel is stationary	Number of periods = 11
AR parameter: **Panel-specific**	Asymptotics: **T -> Infinity**
Panel means: **Included**	
Time trend: **Not included**	
Drift term: **Not included**	ADF regressions: **0** lags

		Statistic	p-value
Inverse chi-squared(106)	P	614.6098	0.0000
Inverse normal	Z	-19.9780	0.0000
Inverse logit t(269)	L*	-23.3038	0.0000
Modified inv. chi-squared	Pm	34.9315	0.0000

P statistic requires number of panels to be finite.
Other statistics are suitable for finite or infinite number of panels.

Interest rate is stationary. Reject the null hypothesis. The p-values are less than 0.05.

APPENDIX 8: OUTPUT OF FISHER TEST FOR INFLATION

```
Fisher-type unit-root test for linflation
Based on augmented Dickey-Fuller tests
```

Ho: All panels contain unit roots	Number of panels = 53
Ha: At least one panel is stationary	Number of periods = 11
AR parameter: Panel-specific	Asymptotics: T -> Infinity
Panel means: Included	
Time trend: Not included	
Drift term: Not included	ADF regressions: 0 lags

		Statistic	p-value
Inverse chi-squared(106)	P	324.4607	0.0000
Inverse normal	Z	-12.2034	0.0000
Inverse logit t(269)	L*	-12.1159	0.0000
Modified inv. chi-squared	Pm	15.0039	0.0000

P statistic requires number of panels to be finite.
Other statistics are suitable for finite or infinite number of panels.

Inflation is stationary. The p-values are less than 0.05. Reject the null hypothesis.

APPENDIX 9: OUTPUT OF FISHER TEST FOR GDP

Fisher-type unit-root test for **lgdp**
Based on augmented Dickey-Fuller tests

Ho: All panels contain unit roots — Number of panels = **53**
Ha: At least one panel is stationary — Number of periods = **11**

AR parameter: **Panel-specific** — Asymptotics: **T -> Infinity**
Panel means: **Included**
Time trend: **Not included**
Drift term: **Not included** — ADF regressions: **0** lags

		Statistic	p-value
Inverse chi-squared(106)	P	322.2622	0.0000
Inverse normal	Z	-12.1310	0.0000
Inverse logit t(269)	L*	-12.0284	0.0000
Modified inv. chi-squared	Pm	14.8529	0.0000

P statistic requires number of panels to be finite.
Other statistics are suitable for finite or infinite number of panels.

GDP is stationary. The p values are less than 0.05. Reject the null hypothesis.