

**CAPITAL STRUCTURE, MACROECONOMIC ENVIRONMENT, FIRM'S  
EFFICIENCY AND VALUE OF COMPANIES LISTED AT THE NAIROBI  
SECURITIES EXCHANGE**


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REQUIREMENTS OF THE AWARD OF THE DEGREE OF DOCTOR OF  
PHILOSOPHY IN BUSINESS ADMINISTRATION UNIVERSITY OF NAIROBI**

**2017**

## DECLARATION

I, declare that this thesis is my original work and that it has not been previously been presented in any other university towards the award of a degree.

Signed .....  ..... Date ..... 4th Aug 2017 .....

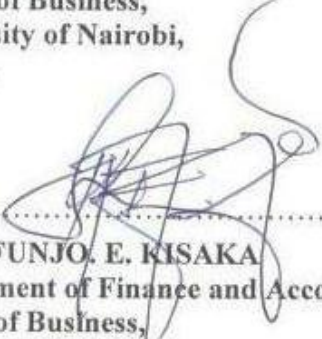
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## **DEDICATION**

I dedicate this Doctoral thesis first to my dear parents. Ann Njagi and the late Dionisio Njagi for giving me the foundation and motivation to seek great heights academically. Secondly my supportive and understanding immediate family Daisy Njagi and Joysheilla Gatwiri.

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## ABBREVIATIONS AND ACRONYMS

<b>CAPM</b>	Capital Asset pricing Authorities
<b>CBK</b>	Central Bank of Kenya
<b>CMA</b>	Capital Market Authority
<b>DISTC</b>	Distribution Costs
<b>DEBTR</b>	Debt Ratio
<b>EPS</b>	Earnings Per Share
<b>EQUITR</b>	Equity Ratio
<b>ERM</b>	Efficient Resource Management
<b>FINC</b>	Financing Costs
<b>GDP</b>	Gross Domestic Product
<b>INTR</b>	Interest Costs
<b>ITR</b>	Inventory Turnover Ratio
<b>JSE</b>	Japanese Stock Exchange
<b>M&amp;M</b>	Modigliani and Miller
<b>MPS</b>	Market Share Price
<b>NPV</b>	Net Present Value
<b>NSE</b>	Nairobi Securities Exchange
<b>P/E</b>	Price Earnings Ratio
<b>RBT</b>	Resource Based Theory
<b>RETR</b>	Retained Earnings Ratio
<b>ROA</b>	Return on Assets
<b>ROE</b>	Return on Equity
<b>SCA</b>	Sustainable Competitive Advantage
<b>SFA</b>	Stochastic Frontier Approach
<b>MSP</b>	Market Share Price
<b>TAX</b>	Taxation
<b>TCE</b>	Transactions Costs Economic
<b>TCT</b>	Transaction Cost Theory
<b>TSE</b>	Taiwan Securities Exchange
<b>WACC</b>	Weighted Average Cost of Capital

## ABSTRACT

In financing an organization, its value is dependent on various components such as the amount of debt, the amount of equity and the amount of retained earnings. The link between these components can be influenced by predictor and controlling variables. This study intended to establish how macroeconomic environment and firm efficiency influence the relation between firm capital structure and value of companies trading on the NSE. The specific objectives were to establish the influence of capital structure on the value of the firms trading on NSE and to determine the moderating influence of macroeconomic environment and the intervening effect of firm efficiency on the link between capital structure and firm value. The study was anchored on the MM theory of capital structure and positivistic philosophy. The longitudinal research design was employed and the population of the study was firms listed at the NSE. For data collection purposes, the research targeted non-financial firms which actively traded from 2009 to 2014. The study hypothesized that capital structure impacts on firms value through the moderating influence of macroeconomic environment and intervening effects of firm efficiency. Data was analyzed using inferential and descriptive statistics. First, descriptive statistics of the variables were outlined. Next, secondary panel data from 30 non-financial firms for the period of six years from 2009 to 2014 was analyzed using STATA 12 statistical software. In situations where the panel data do not meet all the assumption of regression analysis of no autocorrelation, data was analyzed by fitting a Prais Winsten Panel Regression model which gives robust results in the presence of autocorrelation. Moreover, panel regression analysis was conducted using robust corrected standard errors in instances where heteroscedasticity was present. These interventions were undertaken after diagnostic testing to ensure credibility of the results even when the classic linear regression (CLRM) assumptions were not completely met. The findings suggest that capital structure affects firm value through joint influence of macroeconomic environment and firm efficiency. The conclusions of this research expand understanding and knowledge within the field of capital structure, macroeconomic environment and firm value. First, the use of debt to finance firm operations should be increased to maximize the tax shield available to the firms, further debt should be used as a disciplinary role to force firm's managers to manage their firms efficiently and equity holders should also exert some control and influence in management decisions through their representation in the board of directors. Secondly, the government should provide stability of the macroeconomic environment through its fiscal and monetary policies to ensure low inflation rate, tax rate, and high economic growth rate. Thirdly firm's managers should make practical application of agency cost theory through use of debt in their capital structure as disciplinary role of debt forcing firm's managers to manage firm's resources efficiently and the government through Capital Markets Authority (CMA) should develop appropriate policies in an attempt to organize the debt capital markets to enable Kenyan firms get access to low cost long term debt to finance their investment. Consequently, the cost of firm operations declines while firm's profits increase causing the values of the firm to increase. This study is important since it has provided direction on how to integrate optimal financing strategy, efficient management of firm's resources, utilizing opportunities provided by favourable macroeconomic environment in order to realise increased value for Kenyan firms

# **CHAPTER ONE**

## **INTRODUCTION**

### **1.1 Background of the Study**

Immense discussions have been done on the association between capital structure and value of organizations for a long time by both academics and practitioners (Draniceanu, 2013). Evidence from research has established that capital structure decisions influence firm value (McConnell and Servaes, 1995; Rathinasamy, Krishnaswamy and Mantripragada, 2002; and Chowdhury and Chowdhury, 2010) but cannot exhaustively explain variability in firm value. However, these studies have not exhaustively explained the variability in the value of the firm (Kadongo, Makoteli & Maina, 2014). This means other variables such macroeconomic environment and firm's efficiencies do have implications on the link between a firm constitution of capital and value. The re-examination of this relationship is important because the influence of capital structure on the macroeconomic environment and firm efficiency can increase the firm market value (Tan & Litsschert, 1994).

The prevailing macroeconomic environment determines level of firm profitability and market value (Porter & Linde, 1995). In the process of formulating policy options that influence firm value, the organization must take account of macroeconomic forces. When the macroeconomic environment becomes hostile, as it sometimes does, the resources get even scarcer, a situation that forces firms to operate in a state of uncertainty which often results in poor performance (Murgor, 2014). Prevailing macroeconomic environment of a firm determine its opportunities and threats of the present and future which influence the behaviour of the firm impacting on its market value (Porter, 1985). Similarly firm's efficiency in terms of efficient use of resources within a firm can create a competitive



advantage and determine firm ability to use its potentials to neutralise its threats and tap its opportunities (Murgor, 2014). The influence of macroeconomic environment and firm's efficiency on the relationship between capital structure and firm value emanates from their ability to give firms capabilities which are not easily matched by the competitors (Wernerfelt, 1984).

The above conceptualization is anchored on the modiglian and Miller theory (1958 & 1963) Transaction Cost Theory (TCT) by Williamson (1985), Resource Based Theory (RBT) by Penrose (1959), Pecking Order Theory by Myers and Majluf (1984), Trade-off model by Myers (1984) and Agency Theory by Jensen and Meckling, (1976). MM theory of capital structure dwells on the perfections and imperfections of the market. Under perfect market conditions the value of the firm is affected by firm operating profitability rather than its capital structure while presence of corporate tax laws makes the market value of the firm an increasing function of leverage (Modigliani & Miller, 1963). Transaction Cost Theory (TCT) aspires to explain how firms internalize its operations and other structural arrangements required to improve its market value. Similarly the influence of capital structure on firm efficiency and firm value is underpinned by Resource Based Theory (RBT). The RBT explains how possession of unique resources and efficient application of those resources contributes to competitive advantage within a firm and undoubtedly productivity differences (Ongeti, 2014; Pasanen, 2013).

The Nairobi Securities Exchange (NSE) was formed in 1954 with deliberate intentions by brokers of shares traded in listed organizations within the confines of Societies Act. In July 2011 upon promulgation of the new constitution in Kenya 2010, Nairobi Stock Exchange Limited rebranded to Nairobi Securities Exchanges (NSE) to reflect the evolution of NSE

into a full service organization that aids in commercial exchange, clearance and transfer of equities, among other financial assets and trading instruments.

Performance in terms of market value of firms listed at the NSE has been dismal to the extent that some have lately called for financial bailout while others are being delisted from the NSE (NSE Hand Book, 2014). However, some firms have performed exceedingly well despite financing their investment using risky short term financing instruments in place of less risky financing instruments . This deviates from the existing theoretical thinking which would have expected different results. Therefore this means that, other factors apart from financing methods/ instruments emerge to influence and affect the firm performance and their market value (Kadondo, Makoteli & Maina, 2014).

### **1.1.1 Capital Structure**

Capital structure entails methods through which an organization funds its investments and operations using retained earnings, debts and equity (Linh, 2014; Desi & Robertson, 2003). Brealey and Myers (2008) affirm that capital structure is a mix of diverse financial assets to fund organizational investments. This encompasses funding sources that are considered long term in nature (Inanga & Ajayi, 1999). Capital structure constitutes the different proportions of equity and long-term debt (Pandey, 1999)

Maintenance of appropriate capital structure is important for the maximization of returns on investment and effectiveness in managing competitiveness (Linh, 2014). The prevailing argument is that suitable structure of funding sources is achieved when there is an equilibrium between tax savings arising from use of debt and possibility of insolvency. This equilibrium would provide superior financial benefits to the owners than purely using

equity. The eventual effect of the balanced capital structure would be low average cost of capital coupled with high returns to shareholder; in terms of maximized share price (De Angelo & Masulis, 1980).

### **1.1.2 Macroeconomic Environment**

According to Galbraith (2006) macroeconomic environment refers to peripheral aspects in organizations, marketplace and the entire economic spectrum that have an impact on organizational operations. Macro-economic factors influences the entire economy as well as business firms either directly or indirectly. Korajczyk and Levy (2003) argues that the variations in the macroeconomic environment where the firm operates should influence the future value of a firm. Moreover, they state that macroeconomic conditions are determined by several factors, key of which are the interest rates, foreign exchange rates, inflation rates and GDP growth rates that are prevailing in a country.

The real Gross Domestic Product (GDP) portrays economic performance in a country. As such, the GDP component has been adopted in studies as a moderating factor for economic performance. The plausible explanation for this assertion is that during periods of economic boom, business demand more external financing to widen their investment portfolios. Economic growth underpins firms' alteration of their capital structures. The growth in the real GDP affects the cost of finances and hence the future value of firms. It is hypothesized that there is a proportional association between GDP and the real cost of capital (Drobetz & Wanzenried, 2006).

Pressures of inflation heavily impact on the cost of capital. DeAngelo and Masulis (1980) stated that inflation has a negative impact on cost of debt which could increase debt to equity ratios. On the contrary, Schall (1984) notes that in case of high inflation, the earnings on equity are greater than those on debt financing sources. In this case, companies would consider sale of equity better than issuing debt. Given these variations, it can be hypothesized that inflation has an influence on which capital structure business embrace that would eventually affect wealth of the firm and the cost of capital.

The prevailing macroeconomic environment determines the level of firm profitability due to cost of capital benefits arising from favourable interest rates prevailing in the country and the growth in GDP which provides more business opportunities for the firm. Moreover, favourable levels of inflation increase the purchasing power of the citizens thereby enhancing the output and profitability of corporations. On the other hand, when the macroeconomic environment becomes hostile, factors of production become scarce causing a decrease in business prospects. This situation forces firms to operate in a state of uncertainty which often results in poor performance (Murgor, 2014). Thus prevailing macroeconomic environment of a firm determine its opportunities and threats of the present and future (Porter, 1985). In line with these authors, this study opines that the macroeconomic environment prevailing in a country influences access to opportunities or exposure to threats with respect to GDP, interest rates and inflation rate thereby moderating the relationship between capital structure and firm value either positively or negatively depending on whether the macroeconomic environment factors are favourable or unfavourable.

### **1.1.3 Firm efficiency**

The basis for considering firm's efficiency as a link amid capital structure and firm value has been demonstrated by Elsas and Florysiak (2011) who hold that a firm's management utilizes the capital invested to acquire firm assets and leverage technology in the firm core processes resulting to firm efficiencies in terms of operations, costs and profitability translating into positive firm returns and market value.

Leveraging technological innovation in the firm core processes results into potential sources of future economic gain in human resources capability and organizational competencies alongside relational capital in the areas of customers/supplier networks, organizations design and processes (OECD, 2006). This study views investments in technological innovations as a key driver of firm operational, costs, and profit efficiencies leading to superior firm's value.

Strategic application of an optimal capital structure, technological innovations under a favourable macroeconomic environment play a key role in driving the firm market value. This means that the efficiency resulting from the technological innovations being applied by a firm strives to offer high quality commodities cost-effectively providing a positive link between capital structure and firm value. Firm's efficiency in this study has been disaggregated into cost efficiency, operational efficiency and profit efficiency

#### **Cost Efficiency**

According to Rudi (2000), in measuring the cost efficiency of firms, one should compare observed cost and output-factor combinations with optimal combinations determined by the available technology (efficient frontier). The method to implement this analysis could

be either stochastic or deterministic. The former allows random noise due to measurement errors. The latter, on the contrary, attributes the distance between an inefficient observed firm and the efficient frontier entirely to inefficiency.

A further distinction is made between parametric or non-parametric approaches. A parametric approach uses econometric techniques and imposes a priori the functional form for the frontier and the distribution of efficiency. A non-parametric approach, on the contrary, relies on linear programming to obtain a benchmark of optimal cost and production-factor combinations. According to Rudi (2000), it is asserted that there may be differences between specialized and non-specialized firms with respect to the degree of operational efficiency. To test this conjecture, Rudi (2000) estimated a cost function for the different types of firms.

Cost efficiency provides a measure of how close a firm's actual cost is to what a best-practice institution's cost would be for producing an identical output bundle under comparable conditions. The measure is usually derived from a cost function in which costs (C) depend on the prices of inputs (p), the quantities of outputs (y), risk or other factors that may affect performance (z), and an error term  $\varepsilon$ . The function can be algebraically written as shown in equation (1).

$$c = f(p, y, z) + \varepsilon \tag{1}$$

In equation (1),  $\varepsilon$  is treated as a composite error term represented as shown in equation (2);

$$\varepsilon = \mu + v \tag{2}$$

Where  $v$  represents standard statistical noise and  $\mu$  captures inefficiency. In the parametric methods, a firm is labelled inefficient if its costs are higher than a best-practice firm after

removing random error. The methods differ in the way  $\mu$  is disentangled from the composite error term  $\varepsilon$ .

Aigner, Lovell, and Schmidt (1977) proposed stochastic cost frontier in analysis of cost efficiency of commercial firms. In general, the non-parametric methods are less suitable because they assume away noise in the data and luck. But for the purpose of this study, the most important drawback is that these methods generally ignore prices and, thus, can only account for technical inefficiency related to using excessive inputs or producing suboptimal output levels. As Berger and Humphrey (1997) observed, these methods cannot compare firms that tend to specialize in different inputs or outputs because it is impossible to compare input and output configurations without the benefit of relative prices.

Moreover, Berger and Humphrey (1997) used the distribution-free approach as well as the stochastic frontier approach for both the translog and the Fourier specification of the cost and profit function. They concluded that the empirical findings in terms of either average industry efficiency or ranking of individual firm are similar across methods. In equation (2), the random error term ( $v$ ) is assumed to be normally distributed and the inefficiency term ( $\mu$ ) is assumed to be one-sided. Either of the approaches (the half-normal and the exponential distribution approaches) can be used with similar results being reported in both cases. The model below has focused on the half-normal distribution. The inefficiency factor ( $\mu$ ) incorporates both allocative inefficiencies from failure to react optimally to changes in relative input prices, and technical inefficiencies from employing too much of the inputs to produce the observed output bundle. The log-likelihood function is given arithmetically by equation (3). The model can be estimated using maximum likelihood techniques.

$$\ln L = \frac{N}{2} \ln\left(\frac{2}{\pi}\right) - N \ln \sigma - \frac{1}{2\sigma^2} \sum_{i=1}^N \ln \left[ \phi\left(\frac{\varepsilon_i \lambda}{\sigma}\right) \right] \quad (3)$$

Where  $\varepsilon_i = \mu_i + v_i$  ;  $\sigma^2 = \sigma_\mu^2 + \sigma_v^2$  ; N = the number of firms and  $\Phi(.)$  = the standard normal cumulative distribution function.

Inefficiency measures are calculated using the residuals after the model is estimated. For the half-normal case, an estimate of the mean inefficiency is given by

$$\hat{E}(\mu_1) \equiv \left(\frac{2}{\pi}\right)^{1/2} \hat{\sigma}_u \quad (4)$$

Where:  $\hat{\sigma}_u$  is the estimate of  $\sigma_u$ . Since the distribution of the maximum likelihood estimates is known, the approximate standard error can be easily computed. Previously, Jondrow et al. (1982) had showed that a firm-level measure of inefficiency is usually given by the mean of the conditional distribution function of  $\mu_i$  given  $\varepsilon_i$ . For the normal-half-normal stochastic model, the conditional distribution of  $\mu_1$  given  $\varepsilon_i$  is a normal distribution  $N(\mu., \sigma^2)$  truncated at zero, where

$$\mu_1 \equiv \frac{\varepsilon_i \sigma_\mu^2}{\sigma^2} \text{ and } \sigma^2 \equiv \frac{\sigma_\mu^2 \sigma_v^2}{\sigma^2}. \text{ This can be seen by adapting for the cost function the}$$

equation for production function derived in Jondrow et al (1982). The density function is algebraically illustrated in equation (5) below.

$$f(\mu_i / \varepsilon_i) = \frac{\frac{\sigma}{\sigma_\mu \sigma_v} \phi\left[\frac{(\mu_i / \varepsilon_i) - \frac{\varepsilon_i \lambda}{\sigma}}{\sigma}\right]}{1 - \Phi\left(-\frac{\varepsilon_i \lambda}{\sigma}\right)}, (\mu_i / \varepsilon_i) > 0 \quad (5)$$



The conditional mean  $E(\mu_i / \varepsilon_i)$  is an unbiased but inconsistent estimator of  $\mu_i$  since regardless of the number of observations, the variance of the estimator remains non-zero.

### Operational Efficiency

The empirical model takes the following general form:

$$Y = f(x_i, \beta) e^{v_i - u_i}$$

Where  $Y$  is the dependent variable,  $f(x)$  is the functional form,  $\beta$  is the technical coefficient,  $v_i$  is the random component which assumed to be identically and independently distributed with mean zero, and  $u_i$  is the inefficiency effect of the firm. A Cobb Douglas logarithmic function was adopted resulting in estimation equation (6). The estimated Cobb-Douglas stochastic frontier Production function is assumed to specify the technology of the firm. It is specified in the form:

$$\ln Y_i = \beta_0 + \beta_1 \ln X_{1ij} + \beta_2 \ln X_{2ij} + \beta_3 \ln X_{3ij} + \beta_4 \ln X_{4ij} + V_{ij} - \mu_{ij} \quad (6)$$

Where ‘ln’ represents logarithm to base  $e$ ; subscripts  $ij$  refers to the  $j$ th observation of the  $i$ th firm;  $Y$  = value of total output of the firm in sales;  $X_1$  = total assets;  $X_2$  = cost of sales;  $X_3$  = debt financing costs;  $X_4$  = equity cost;  $V_{ij}$  = a symmetric error component that accounts for random effects and exogenous shocks.  $\mu_{ij} \leq 0$  = a one sided error component that measures technical inefficiency. It is assumed that the technical inefficiency effects are independently distributed and  $\mu_{ij}$  arises by truncation (at zero) of the normal distribution with mean  $\mu_{ij}$  and variance,  $\delta_2$ , where  $\mu_{ij}$  is defined as:

$$\mu_{ij} = \delta_0 + \delta_1 \ln Z_{1ij} + \delta_2 \ln Z_{2ij} \quad (7)$$

Where  $\mu_{ij}$  represents the technical efficiency of the  $i$ th firm;  $Z_1$  = years of operation; and  $Z_2$  = firm size;  $(V_i-U_i) = A$  composed error term where.  $V_{ij}$  is the random error term (statistical noise) and  $U_i$ ; represents the technical inefficiency. The maximum–likelihood estimates of the  $\beta$  and  $\delta$  coefficients in equations (6) and (7), respectively was estimated simultaneously using the computer program FRONTIER 4.1. The above model was used for determining the efficiencies of firms in this study.

### **Profit Efficiency.**

According to Rudi (2000), profit efficiency measures how close a firm comes to generating the maximum obtainable profit given input prices and outputs. Berger and Mester (1997) used the concept of alternative profit efficiency to relate profit to input prices and output quantities instead of output prices. Alternative profit efficiency compares the ability of firms to generate profits for the same level of outputs and thus reduces the scale bias that might be present when output levels are allowed to vary freely. If customers are willing to pay for high-quality services, the offering firms should be able to earn higher revenues that compensate any excess expenditure and remain competitively viable.

In evaluating profit efficiency, the profit function uses essentially the same specification as the cost function. The dependent variable is now  $\ln(\pi + |\pi_{\min}| + 1)$ , where  $|\pi_{\min}|$  is the absolute value of the minimum value of  $\pi$  in the appropriate sample. In practice, the constant term  $|\pi_{\min}|+1$  is added to every firm's profit so that the natural log is taken of a positive number. This adjustment is necessary since a number of firms may exhibit negative profits in the sample period. The dependent variable is  $\ln(1)=0$  for the firm with the lowest value of  $\pi$ .  $\pi$  is calculated as all earnings minus interest and operating costs. The explanatory variables remain unaltered. In this case,  $\pi$  is based on the output-mix

combining traditional and non-traditional firm activities. This produces a measure of profit efficiency denoted by PE. A PE of 0.8 would mean that a firm is actually earning 80% of best practice profits or that the firm is losing 20% of possible profits due to excessive costs, deficient revenues, or both (Rudi, 2000).

#### **1.1.4 Firm Value**

The main goal of managing organizational funds is accomplishing the objective of wealth maximization. Ehrhard and Bringham (2003) stated that the wealth of the business is determined by the future cash flows' present value discounted using the company's WACC (Linh, 2014). This means that WACC directly influences firm value (Johannes & Dhanraj, 2007). Market value can be used to measure the performance of publicly listed firms since it requires information on the current stock prices. Additionally firm value considers all future benefits to the firm, both short-term and long-term. This eliminates the problem of estimating the time lag between implementation and increased profitability or productivity. Other accounting ratios like the price to earnings ratio (P/E) ratio and market-to-book value ratio suffer from a number of flaws in that accounting rules change, shifted reported earnings without any real change in the underlying business. Further the large number of accounting loopholes makes it easy for executives to mislead investors. Various evidence based studies have used this market stock price to represent the firm value (Cheng & Highes, 2012, Boyd, 2010, Kakat, 2005, McConnel & Servaes, 1990)

Funds and a balance of sources of funding organization activities pre-determine attainment of efficiency in using firm resources. This means that selecting appropriate risk and economic environment for the company effectively reduces the cost of financing firm investments and operations (Kohher, 2007). The value of a firm can be determined through

different methods but for the purpose of this study the value of the firm was obtained through firm market share price.

### **1.1.5 Nairobi Securities Exchange**

The Nairobi Securities Exchange (NSE) was constituted in 1954 as a cooperation of share brokers registered under societies act with the mandate to develop and regulate trading activities (Ngugi, 2003a). However, the Kenyan government has come up with many reforms initiated towards the development of the stock market.

The key role played by the NSE is to promote a culture of savings whereby savers can safely invest their money and consequently earn a return. NSE plays an important role of facilitating the mobilization of capital for development through provision of an alternative saving tool to the Kenyan savers. The money that was previous saved or spent was redirected to investment projects in different economic sectors (NSE Hand Book, 2014). This is an incentive to consume less and save more (NSE Hand Book, 2014). In July 2011 upon promulgation of constitution of Kenya 2010, the Nairobi Stocks Exchange Limited rebranded to Nairobi Securities Exchange (NSE). As at December 2014 there were 62 firms trading their shares at the NSE (NSE Hand Book, 2014). The NSE has a mandate to control and manages stock and debt trading activities.

Effective management of the financing strategies is imperative to the firm financial success and well-being hence the need for managers to manage their firm capital structure carefully. A false decision on capital structure may lead to financial distress and, eventually to bankruptcy (Donaldson's, 1961). A continuing debate in corporate finance exists over the question of how firms finance their investments and the effect of the financing

strategies on the firm value (Graham & Harvey, 2001). Performance of firms listed at the NSE has been dismal to the extent that some have lately called for financial bailout. This has been attributed to factors related to capital structure decision as well as other factors within and outside the firm which could have adversely affected firm performance and their market value (Lucy, Makau & Kosimbei, 2014; Kadongo et al., 2014). Some firms in NSE have faced distressing situations following their dismal performance and have been under constant pressure to not only deliver efficient quality services at minimal cost but also improve their market value. For the last two decades there has been numerous reports on mismanagement, maladministration and or financial irregularities reported in firms listed at the NSE (Kinuu, 2014). A joint study by World Bank and KIPPRA, (2003) on funding new investment projects of firms trading shares at the NSE noted that new investments are mainly funded by use of short term financing and to some extent through the bank loans including short term bank overdrafts. The study established that equity financing contributed minimally suggesting that equity financing is not a popular alternative amongst firms listed at the NSE.

## **1.2 Statement of the Problem**

The link between capital structures of firms and their value have been considerably debated (Draniceanu, 2013). The Modigliani and Miller theory of 1958 assumed a perfect market with the key assumptions of information symmetry implying that in an ideal marketplace context, the value of a firm is not dependent on how the firm is financed. This may not be the case in practice since market imperfections emerge in form of taxes, information asymmetry and other market inefficiencies causing variations in the value of the firm (Draniceanu, 2013).

The debate on the influence of capital structure on the value of firm is inconclusive given that empirical studies have yielded inconsistent results ranging from positive, negative to no relationships at all. Holz (2002) noted that debt to equity ratio has a positive correlation with business success or performance and value in terms of return to the owners of the firm (ROE) and return on the assets owned by the firm (ROA). The results indicate that financial managers effectively use borrowed funds to augment shareholders' earnings. The studies by Abor (2005), Biekpe (2007) confirms the empirical results by Kadongo et al. (2014) that capital structure cannot exhaustively explain the variations in firm value. This means other variables such as macroeconomic environment and firm efficiency surface to accelerate, decelerate or moderate the relationship between capital structures and firms market value.

The review of the literature by Majumdar and Chibber (1997), Holz (2002), Dessi and Robertson, (2003); Abor (2005), Abor and Biekpe (2007) and Kadongo et al., (2014) on the relationship between capital structure firm value has provided mixed results that reveals knowledge gaps and raises a fundamental question about the link between capital structure and the value of firms listed at the Nairobi Securities Exchange. Additionally capital structure concept has largely been studied in developing countries and understudied in Kenya a developing country and at a level addressed by this study

The government of Kenya and the private sector have invested heavily in NSE to create an enabling environment for doing business. While some firms listed at the NSE have performed exceedingly well others have been experiencing declining performance despite having the right capital structure combinations to an extent that some of the firms have even been delisted from the NSE (NSE Hand Book, 2014). In the last decade (2005- 2014)

six firms (East Africa Packaging, African Tours and Hotels ltd, Eliots Bakery ltd, CMC Holdings, Access Kenya, Tim Sales) were delisted due to poor performance. This was mainly attributed to factors both within and outside the firm other than their capital structure which could have negatively affected their performance and the resulting market value. Their dismal performance did not only adversely affect their market value but also shareholders wealth. Additionally global economic changes such as global economic recession, fluctuation in oil prices, climate change and lately terrorism have adversely affected economic environment for businesses in Kenya (NSE Hand Book, 2014). Further the situation has been compounded by firm efficiency with regard to inefficiencies emanating from mismanagement, maladministration and or financial irregularities which militate against firm productivity and growth in firm market value (Letangule & Letting, 2012; Kinuu, 2014).

A number of methodological differences /gaps emerged between prio studies and the current study. For example Holz (2002) used debt ratios as a proxy for capital structure and return on equity (ROE) and return on the assets (ROA) to measure firm performance and value. Rayan (2008) used debt to equity ratio as proxy for capital structure and the firm value was measured by use of Earnings per share, price Earnings ratio, Return on Equity, Return on Assets, Earnings Value Added, and Operating profit Margin. Similarly Kodongo, Mokoteli and Mwangi (2014) reviewed leverage against value of firms using profitability and Tobin Q while Mwangi, Makau and Kosimbei (2014) used return on assets (ROA) and return on equity (ROE) to measure firm performance. The above measures of firm value can be manipulated by management and therefore fail to sufficiently measure firm performance and value unlike market share price used in the current study which is

information driven (market perception value ) by factors related to firm's financing strategies, efficiencies and macroeconomic environment existed in the past and anticipated into the future.

Further methodological difference between the above empirical studies and the current study is that panel data scrutiny aided in assessing the extent to which the dependent variable is a function of different independent variables in the current study. This is in contrast with some of the previous studies which employed a simple pooled ordinary least squares regression analysis methodology, thereby ignoring the time dimension of the data. In situations where the panel data did not meet the assumption of regression analysis of no autocorrelation, analysis was conducted by fitting a Prais Winsten Panel Regression model which is robust for serial correlation. Likewise, corrected standard errors were utilized in instances where the assumption of no heteroscedasticity was violated. Diagnostic testing, which was largely ignored in previous studies, and the consequential remedial measures helped the researcher to enhance the credibility of the results.

This study took cognizance of the fact firm value may be a function of factors key among them capital structure. This means that other factors apart from financing influences the firm performance and market value (Kandongo, Makoteli and Maina, 2014) The above empirical studies on capital structure and firm value relationship did not identify nor examine the influence of the macroeconomic environment and the linkage of firm efficiency on the relationship between capital structure and firm value nor consider fitting appropriate robust Panel Regression models in situations where normal panel regression models did not fit the data sets of the firms floating their shares at the NSE.



This study sought to address these gaps by answering the research question: How does macroeconomic environment and firm efficiency influence the link between capital structure and value of firms whose shares are traded at NSE by use of panel data regression analyses and in situations where the panel data sets did not meet the all the assumptions of regression analysis, the panel data sets were analysed by fitting an appropriate robust Panel Regression models.

### **1.3 Objectives of the Study**

#### **1.3.1 General Objective**

The general objective of this research was to establish the moderating and intervening influence of macroeconomic environment and firm's efficiency on the relationship between capital structure and value of the firms listed at the NSE.

#### **1.3.2 Specific Objectives**

The specific objectives were to:

- i) Establish the relationship between capital structure and the value of firms listed at the NSE.
- ii) Determine the moderating influence of macroeconomic environment on the relationship between capital structure and value of firms listed at the NSE.
- iii) Ascertain the intervening effect of firm efficiency on the relationship between capital structure and value of firms listed at the NSE.
- iv) To determine the joint effect of capital structure, macroeconomic environment and firm efficiency on the value of firms listed at the NSE.

#### **1.4 Value of the Study**

This study is expected to add value into the existing knowledge in the areas of capital structure, macroeconomic environment, firm efficiency and firm value in five main ways: The first major contribution is the determination of the relevant factors that are important in defining capital structure in firms listed in Nairobi Securities Exchange. Although capital structure indicators (debt to equity ratio, retained earnings ratio, debt capital ratio and equity capital ratio) are used to operationalize capital structure, experiences from corporate sector indicate that Kenyan firms are relying more on equity capital than retained earnings and debt. Thus the pecking order being equity, retained earnings and debt. This study is meant to educate firm owners the importance of using retained earnings and in the absence of retained earnings debt capital in order to benefit from tax shields advantages to protect firm profit from heavy taxation in terms tax shields benefits.

Secondly, the study is envisaged to enhance building of existing theories by examining theoretical propositions such as capital structure theories, transaction cost theory and resources based theories whose key paradigm is the structural arrangement in aligning the firm operations within the turbulent macroeconomic environment and internalize the ever evolving firm efficiency in terms of efficiencies with both internal and external environment in order to realize superior performance of their firms. Based on the forgoing, firm managers should be able to reap the benefits from agency cost theory due to disciplinary role of debts in their capital structure compositions which forces them to manage their firms efficiently from the point of view of operational efficiency, cost efficiency and profit efficiency in order to realise sufficient funds to pay off interest and outstanding debts (principle). The strength of each of each measures of efficiencies should drive the firm and significantly impact the overall value of the firm in the market .

Thirdly, the findings of this study are useful to various stakeholders including investors, corporate managers, regulators and the government. The effects of capital structure on firm value should help investors and corporate managers when financing their firm investment and operations especially in the use of debt due to tax advantages embodied in this form of financing when their firms are not able to retain funds from their profits, The government through Capital Markets Authority (CMA) and other stakeholders in the Kenyan corporate sector should develop appropriate policies in an attempt to organize the debt capital market to enable Kenyan corporate bodies get access to low cost long term debt capital to finance their investments and operations. It is imperative to develop suitable trading regulations and mechanisms to augment the effectiveness of debt market as optimal liquidity in secondary market reduces the cost of capital which positively impacts in the value of Kenyan firms. Previous studies had revealed that Kenyan firms relied more on costly equity finances instead of debt financing locking themselves out of the tax shields benefits meant to enhance the value of the firms.

Fourthly, the outcome of this study enables the managerial practitioners to appreciate the integration of the various financing methods in the face of turbulent macroeconomic environment and ever evolving firm efficiency and correctly interpret the signals being conveyed by these variables in order to generate the most rewarding values of their firms. This involves leveraging their firm core processes with the latest technology which will enable them benefits from efficiencies brought about by technological innovations. This strategy will enable firm save on their costs which is very critical in generating enhanced value of their firms.

Lastly, this study contributes in reducing the controversy on the relationship between capital structure and firm value by showing that the relationship is not direct but is rather moderated by macroeconomic environment and intervened by firm efficiency. This can explain why many researchers who have tested the relationship between capital structure and firm value have found contradictory results with some concluding the relationship between the variables to be positive (Holz, 2002; Dessi& Robertson, 2003; and Kadongo et al., 2014), negative (Majumdar& Chibber, 1997; Abor, 2005) or not significant (Abor& Biekpe, 2007). This study provide fine grained directions that the linkage of capital structure to the firm value can best be understood by considering how macroeconomic environment and firm efficiency influence the relationship between capital structure and firm value.

### **1.5 Organization of the Study**

The first chapter offers background information, explains the research problem, the study objectives, and the significance of the research. The second chapter highlights the theoretical foundation that guide the relationship between the variables. Five theories that is MM theory of capital structure, trade off theory, pecking order theory, agency theory transaction cost theory and resource based theory are used to predict the expected relationship amongst the research variables. Selected empirical models that guide the study are included. The chapter ends with four main research hypotheses.

The third chapter highlights the framework that aided in reaching the research goals including the data collection, their sources and how the variables were operationalized, measured, and analysed. Chapter four presents the results of the data analysis, discusses the descriptive statistics on capital structure, macroeconomic environment, firm efficiency and value. Further diagnostic tests on the above variables which includes, tests for

multicollinearity, serial correlation, heteroscedasticity and panel level stationarity are also discussed.

Chapter five presents the results of the tests of the four null hypotheses. The chapter concludes with a discussion of the results of the hypothesis tested. Chapter six gives a review of what was found out, conclusions of the study, contributions of the research findings to knowledge, managerial policy and practice. The chapter further indicates the limitations of the study and concludes with the suggestions for further studies.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter reviewed and critiqued the existing theoretical and empirical literature of the study. Section 2.2 discusses the theoretical review of the study. Section 2.3 presents the review of the empirical literature; Section 2.4 is the summary of the literature and knowledge gaps Section 2.5 gives a conceptual framework of the study while section 2.6 presents a conceptual hypothesis.

#### **2.2 Theoretical Review**

Theoretical support for the study was drawn from the theories dealing with capital structure, transaction costs and resources based theories. There are several theories that explain the relationship between how firms are financed, managed and the resultant value. They include Modigliani and Miller theory of capital structure (1958 & 1963) Transaction Cost Theory (TCT) by Williamson (1985, 1998) Resource Based Theory (RBT) by Penrose (1959), Pecking Order Theory by Myers and Majluf (1984), Trade-off model by Myers (1984) and Agency Theory by Jensen and Meckling. MM theory of capital structure is the anchoring theory in this study.

##### **2.2.1 Modigliani and Miller Theory of Capital Structure**

This theory as propounded by Modigliani and Miller states that if the capital markets are perfect, an organization's profitability has a larger impact on its value than capital structure does, that is value irrelevant (Modigliani & Miller, 1958). The Modigliani and Miller hypothesis is identical with the net operating income approach. At its heart, the theorem is an irrelevance proposition, but the Modigliani-Miller Theorem provides conditions under

which a firm's financial decisions do not affect its value. They argue that in the absence of taxes, a firm's market value and the cost of capital remain invariant to the capital structure changes. In their 1958 articles, they provide analytically and logically consistent behavioural justification in favour of their hypothesis and reject any other capital structure theory as incorrect. The Modigliani-Miller theorem states that, in the absence of taxes, bankruptcy costs, and asymmetric information, and in an efficient market, a company's value is unaffected by how it is financed, regardless of whether the company's capital consists of equities or debt, or a combination of these, or what the dividend policy is.

The Modigliani-Miller theorem can be best explained in terms of their proposition 1 and proposition 2. However their propositions are based on certain assumption and particularly relate to the behaviour of investors, capital market, the actions of the firm and the tax environment. According to I.M Pandey (1999) the assumptions of the Modigliani - Miller irrelevance proposition is based on

Perfect capital markets in which securities (shares and debt instrument) are traded in the perfect capital market situation and complete information is available to all investors with no cost to be paid. This also means that an investor is free to buy or sell securities, he can borrow without restriction at the same terms as the firm do and behave rationally. It also implies that the transaction cost (cost of buying and selling securities) do not exist.

Homogeneous risk classes in which firms can be grouped into homogeneous risk classes. Firms would be considered to belong to a homogeneous risk class if their expected earnings have identical risk efficiency. It is generally implied under the M-M hypothesis that firms within same industry constitute a homogeneous risk class. The risk of the investors is

defined in terms of the variability of the net operating income (NOI). The risk of investors depends on both the random fluctuations of the expected NOI and the possibility that the actual value of the variable may turn out to be different than their best estimate. Further M-M theorem assume that no corporate income taxes and personal tax exist. That is, they are both perfect substitute and that firms distribute all net earnings to the shareholders, which means a 100% payout.

In subsequent corrections, Modigliani and Miller (1963) established that when it is possible to deduct interest expenses from the tax liability, the value of a firm increases as the level of its leverage increases. With corporate income tax rate  $r_c$ , and  $p$  on an after tax basis, the equilibrium market value of levered firm is given by:

$$V_L = \bar{X}(I - r_c)/p + r_c D_L$$

Where,  $X$  equals expected earnings before interest and taxes,  $\bar{X}(I - r_c)/p = V_u$ , value of the firm if all-equity-financed, and  $r_c D_L$  is the present value of the interest tax-shield, the tax advantage of debt. Given  $\bar{X}$ ,  $V_L$  increases with the leverage, because interest is a tax-exempt expense. This theory suffers from some limitations in that as the theory successfully introduces the potential effects of corporate taxes into the theory, it only leads to an extreme corner effect as the firm value is maximized when 100 per cent debt finance is used (Mollik, 2008). Miller (1977) also showed that tax savings on interest expenses are not certain, and the presence of personal taxes makes it difficult to derive maximum benefit from using debt. De Angelo and Masulis (1980) also argued that tax shields that accrue from non-debt sources introduce constraints on the benefits of using debt to attain a tax advantage.



With respect to arbitrage process the principle that Proposition 1 is based on the assumption that two firms are identical except for their capital structure which cannot command different market value and have different cost of capital. Modigliani and Miller do not accept the net income approach on the fact that two identical firms except for the degree of leverage, have different market values. Arbitrage process will take place to enable investors to engage in personal leverage to offset the corporate leverage and thus restoring equilibrium in the market.

On the basis of the arbitrage process, M-M conclude that the market value of firms are not affected by leverage but due to the existence of imperfections in the capital market, arbitrage may fail to work and may give rise to differences between the market values of levered and unlevered firms. Proposition 2 which incorporates arbitrage process may fail to bring equilibrium in the capital market due to weaknesses in this proposition which includes differences in lending and borrowing which assumes that firms and individuals can borrow and lend at the same rate of interest which does not hold in practice due to the fact that firms which hold a substantial amount of fixed assets will have a higher credit standing, hence they will be able to borrow at a lower rate of interest than individuals. The proposition also assumes that personal leverage and corporate leverage are perfect substitute which cannot hold in practice due to the fact that firms have limited liability while individual have unlimited liability. For examples, if a levered firm goes bankrupt, all investors will lose the amount of the purchase price of the shares. But if an investor creates personal leverage, in the event of a unlevered firm's insolvency, he would lose not only his principal in the shares but also be liable to return the amount of his personal loan.

On the other hand transaction cost interfere with the working of the arbitrage. Due to the cost involved in the buying and selling of securities, it is necessary to invest a larger amount in order to earn the same return. As a result, the levered firm will have a higher market value. Further personal leverage are not feasible as a number of investors would not be able to substitute personal leverage for corporate leverage and thus affecting the work of arbitrage process. The proposition also ignores the corporate taxation and personal taxation and personal aspect of financing through retained earnings. In real world, corporate will not pay out the entire earnings in the form of dividends and investors will not show much interest in purchasing low rated shares by highly geared firm.

This study is anchored on the Modigliani and Miller (MM) theory of capital structure as one of the theoretical underpinnings in explaining the link amid capital status of an organization and firm value, the influence of macroeconomic environment and firm efficiency are potential candidates to introduce market imperfections alongside other associated costs influencing the relationship between capital structure and firm value. The theory is important in the study as it sought to explain management of agency costs through disciplinary role of debt capital in the firm's capital structure and the influence equity holders in the management of the company affairs through their representation in the board of directors impacting in the generation of increased firm's value.

### **2.2.2 The Pecking Order Theory**

The theory was suggested by Myers and Majluf in 1984 and stated that businesses rank their sources of funding operations and investments (from retained earnings to debt to equity) such that equity gets the least preference. Hence, internal funds are used first, and after their depletion, the issuance of debt follows. Firms only consider equity issuance

when it does not make sense to increase the level of debt. Key concepts of this theory include the role of asymmetric information and transaction costs in shaping market outcomes. Costs related to information asymmetry arise when a firm ignores external funding and fails to invest in projects with positive NPV. The low preference for equity results from perceptions of overvaluation among investors whenever managers consider raising capital using equity. Myers and Majluf (1984) posit that the mispricing of equity results from the wide deviation between the information possessed by investors regarding the firm, and the true state of affairs. Some investors know that companies usually issue new equity when the value of outstanding shares does not reflect the intrinsic level; this knowledge causes the rational adjustment in the price that investors intend to pay for new shares. Transaction costs comprise another premise of the pecking order theory. According to Baskin (1989), firms prefer financing sources whose transaction costs are low; consequently, debt gains preference as it attracts lower transaction costs than equity does. By avoiding these external transaction costs the value of the firm is improved and sustained over time. This alternative of short-term financing is disadvantageous in that the supplier of this form of financing will charge higher interest rate as there is no security or collateral, however the owners are assured of control of their firm, which is not diluted, by new shareholders or owners.

Myers (1984) considers the lack of favourable combination of equity and debt as a logical consequence of the pecking order theory. Changes in a firm debt ratio are proportional to the level of its cash flows; as the cash flows increase, the debt ratio declines. The application of the pecking order results into sets of costs, on one hand the increase in the level of debts in the capital structure increases the likelihood of incurring

financial distress costs and in an effort to avoid this type of costs implies that the firm will not be able to take up emerging projects that have positive NPV, this is a form of opportunity costs. To mitigate this kind of costs firms with growth prospects will try to avoid the depletion of the reserve capacity for borrowing in the short run.

### **2.2.3 The Trade-Off Model**

Modigliani and Miller (1958) initially argued that firms maintain an optimal capital structure, which strikes a delicate balance between the risk that a firm will go bankrupt and the benefits resulting from tax-deductible interest expenses. The tax benefit of using debt imply that for a firm to maximize its value, it must only use debt in funding investment projects. However the existence of bankruptcy costs discourages firms from trading off equity for debt (Brigham & Gapenski, 1996). Firms attain an optimal mix of debt and equity when their marginal bankruptcy cost is at least as large as the marginal benefits that result from the higher tax savings associated with using more debt. An efficient managerial team should keep track of the evolution of the capital structure in order to establish whether the firm has attained the optimal capital structure; after this, they should strive to ensure the firm does not deviate from this optimum level. Simerly and Mingfang (2000) established that the lack of a target for the optimal capital structure in firms stems from the lack of adequate managerial incentives. Myers (1984) sees firms adopting the trade-off model as those with a deliberate objective of containing the adverse impact of debt on firm value. The undervaluation of equity in the market creates a disincentive for issuance of equity, which creates undesirable perceptions among investors in the capital markets. The difficulties in raising equity compound the attractiveness of debt as indicated by Miller (1997); tax savings are seemingly large and predictable, whereas bankruptcy costs are not

substantial. Firms with a high level of profitability should have a markedly different preference for debt compared to those with lower profits; highly profitable firms have larger profits that they must shield from taxes. The static trade-off perspective equally considers capital structure decisions as a balance of interest-tax-shield considerations against the expenses resulting from financial distress. The variations in the efficiency of firms in terms of efficiency lead to differences in the leverage ratio that firms aim to attain. There are also differences in the nature of institutions, the financial systems, the rates of taxation, and laws regulating bankruptcy processes; these differences have a profound impact on the capital structure decisions. Where the value of intangible assets is high, the firm faces a risk of losing them during the liquidation process. (De Angelo & Masulis, 1980). There must be a high level of reliance on the debt-servicing capacity to ensure that there are adequate shields on a firm income against taxation translating to higher profitability and market value for the firm.

#### **2.2.4 Agency Theory**

Jensen and Meckling (1976) developed the agency theory framework to highlight the costs associated with the separation of the ownership and control of the firm. The conflict between shareholders and managers can be resolved through the principals monitoring the agents or offering them incentives in order for them to work in the best interest of the principals. A key issue with the theory is that monitoring can be difficult to practically execute and costs associated with the exercise can be non-trivial. Academicians, such as Macho-Staedler and Perez-Castrillo (1997) have suggested that it might be less costly to seek goal congruence between owners and managers. Attaining goal congruence between owners and managers is also difficult especially due to the fact that self-interest may make

managers not fully disclose to the owners their true goals.

In proprietary ownership firms, the owners, managers and customers are three distinct parties with checks and balances to reduce the likelihood of managers pursuing their interests at the expense of the shareholders

The agency costs mentioned above do play a part in the determination of the ultimate value of the firm depending on how the firm capital structure has been structured. Some agency costs result from issuing equity; there are expenses of monitoring the activities of the agent as well as paying the costs of the agent's bonding expenses. The principal faces the possibility of a reduction in welfare when the agent makes sub-optimal decisions. On the other hand, issuing debt provides an incentive for investing in risky projects with high returns, although there is a drastic increase in the risk of failure (Hansaker, 1999). Using equity and debt attracts agency costs, making the optimal capital structure a balance of the two sets of agency costs. The first set relates to committing a huge amount of a company's earnings to the payment of interest and dividends which in a way helps in the management of agency costs resulting from free cash flows. When we control for the degree to which a business is profitable, a high level of leverage and low levels of dividend payout is associated with high levels of investment. This is the same prediction offered in discussions of incentives for controlling shareholders and bondholders when debt has a high risk, investments fall below the conventional threshold and there are conflicts in substituting assets (Fama & Miller, 1972; Jensen & Meckling, 1976; Myers, 1977). The anticipation of inappropriate behaviour by the agent may prompt the debt holders to demand a premium as a justification for the increase in the level of risk.

When wastages in free cash flow are controlled and the funds are directed towards profitable firm investment, the firm will be appealing to the investors to bid for the ownership of firm. To support this study motivation of value addition, the presence of debt in the firm capital framework perform this role of directing firm free cash flow towards profitable firm investment and this will create demand for the firm shares improving the share price of the firm as evidenced by Fama and Miller (1972).

### **2.2.5 Transaction Cost Theory**

This theory has become an increasingly useful framework for assessing how a variety of issues are important to organizations (Williamson, 1985, 1998; Ghoshal & Moran, 1996; Jones, 2004; Madhok, 2002). The TCT has included global business and strategic management as areas of focus in deriving insights on the ways firms can enhance their value.

Transaction cost theory is clear about the fact that firms can obtain economic outcomes that are not efficient. An important premise of TCT is the qualitative aspect of the differences between the incentives underlying hierarchies and those underlying the market. These incentives can encourage actors to work together in cases where their absence would create inefficient outcomes. Williamson (1985) argues that TCT's main concern is the dynamics of the organization of modern economic transactions. TCT considers the reasons behind the internalization of some economic transactions inside a firm boundaries, whereas others are placed under the responsibility of external parties. The general derivation is that the internalization of activities within a firm boundaries results from market failures, especially that of intermediate outputs. Transaction Costs Theory (TCT) argues that transacting through the market creates costs that a firm can lower using different

mechanisms (Coase, 1937; Williamson, 1985). Williamson (1985) further notes that a firm incurs a cost to draft, negotiate, and safeguard an economic transaction. According to the TCT, the costs of an economic transaction are no less important than are those of producing the actual output, and the assessment of operating costs is easier compared to the cost of an economic transaction. In this study, transaction costs comprise an integral element of all the costs incurred by a firm, which, has a bearing on the firm's overall costs in terms of production of goods and services. The efficiency with which this critical costs is managed plays a fundamental role in the link between an organization's capital structure and its value in the market.

#### **2.2.6 Resource Based Theory**

This theory aids in comprehending the attainment of competitive advantage within a firm and how it can upheld for a long period (Barney, 2001; Pearce, Robinson, & Mital, 2012). This theory states that the different organizational resources greatly impacts on firm productivity. Changes in organizational assets or resources will undoubtedly lead to performance differences. Therefore, possession of resources which are unique is a source of superior performance and increased value for the firm (Pasanen, 2013).

The RBT propositions arose from studies by Penrose (1959) and Chandler (1962). They held a view that organizational success was dependent on company resources. RBT further states that a successful business must have resources to use (Dollinger, 2003). This theory is used to explain how the availability and efficient utilization of resources can create a sustainable competitive advantage (SCA) and hence contribute to a firm value. Penrose (1959) posited that the manner in which a firm deploys its resources can give it competitive advantage over its competitors. This view was supported by Barney (1991) who contends



that firms that own resources which are rare, valuable, inimitable and non – substitutable would attain a sustained competitive advantage. This theory posits that the conceptualization of firms can take the form of a collection of resources, with the distribution of resources across a firm occurring in a heterogeneous manner; the differences inherent in resources also tend to remain persistent (Amit&Schoemaker, 1993; Penrose, 1959; Wernerfelt, 1984). These assumptions have encouraged investigators to argue that sustainable competitiveness results from the possession of resources that; have a high value, are rare, and are difficult for competitors to imitate (Barney, 1995; Peteraf, 1993).

The extent to which resources are flexible influences the degree to which a firm can initiate a successful response to changes in the external environment. Wiklund and Karlsson (1994) have identified diverse forms of flexibility, including that of inputs, outputs, the internal environment, and production networks. The nature of resources in a firm possession constitutes its internal flexibility, e.g. flexibility of factors of production or the structure of the firm.

Dyer and Singh (1998) argue that to the extent that a firm relates well with its external environment, such as stakeholders, it has the capacity to respond well to external factors, which constitutes competitive advantage. However, negative outcomes can result from the dependency that network relations tend to create (Pfeiffer & Salancik, 1978). Barney (1999) further argues that the decision on the kind of operating activities to undertake within a firm, and those to outsource, is critical in the maintenance of competitiveness and a strategic focus. The RBT's growing influence has provoked research with some stating that organizational assets greatly facilitate firm expansion (Talaja, 2012; Grant & Jordan, 2012). RBT continues to face challenges from scholars who hold that it has deficient

explanations and thus considered vague (Priem & Butter, 2001). These limitations necessitate the need for evidence-based research on the variable and how this relates with the concepts being studied (Ongeti, 2014).

### **2.3 Firm Value Measurement**

Companies are owned by shareholders, the shareholders hire management to manage their investments. One of key objectives of management is to maximize the shareholders returns on their investment hence the essence of financial management is the creation of shareholders wealth through enhanced value of the company's share prices. According to Ehrhard and Bringham (2003), discounting at the weighted average cost of capital all the cash flows that a business' assets will generate in future gives its present value; the assumption is that the business is operating as a going concern (Linh, 2014; Johannes & Dhanraj, 2007).

Maximizing shareholder value requires financial, technical, human resources while obtaining optimal maximum efficiency from these resources while selecting appropriate risk for the company effectively reducing the cost of financing firm investments and operations (Kohher, 2007). This implies that enhanced firm value can be realised through application of value additive financing combinations within a framework of a favourable macroeconomic environment and efficient applicatin of firm resources in the generation of superior firm market value.

The measures of firm value are basically returns to the firm assets and the owners of the firm in the form of enhanced market price of firm shares. In order to achieve this objective of enhanced firm market share price, the firm core processes and resources have

to be efficiently managed in a manner that optimal inputs are used to generate the desired output. This can only happen if the macroeconomic environment is favourable (Isiki & Hassan, 2002). The value measurement that are in line with the firm objectives are firm optimal efficiency or inefficiency assessment, essentially measuring how well the firms manages its resources in the process of maximizing shareholders wealth in terms of firm earnings resulting to enhanced market price of the firm shares. Inefficiencies refer to how a firm fails to attain the maximum output for a given set of inputs, or the failure to minimize inputs for a particular set of outputs. Frontier analysis provides the means for measuring firm efficiency linking to the enhancement of the firm value; it can be either parametric or non-parametric. Through frontier analysis, it becomes possible to benchmark firm efficiencies to best practice firms as linkage to the value generation /performance of units that make decisions. Berger and Mester (1997) argue that for frontier analysis to be applicable, it is necessary to specify the inputs as well as outputs of a production process.

### **2.3.1 Parametric Approaches to Performance Measurement of Firms**

Various parametric methodologies including stochastic frontier approach (SFA), the deterministic frontier analysis (DFA) and the thick frontier approach (TFA) are adopted in assessing organizational performance. In SFA, a function is specified; this function could describe the costs, profits or production as they relate to input units, output units and variables in the environment. The prediction of the output expectations is based on real data about the inputs. Random error which increasingly follows a normal distribution-constitutes the deviation of the output that the model predicts from what is actually observed; the other component of this deviation is the inefficiency of the production process, which take positive values and therefore have a half-normal distribution. Berger

and Humphrey (1997) argue that this approach is difficult to use because of the need for the specification of production functions, besides the cumbersome task of separating random errors and inefficiencies apart.

The deterministic frontier analysis equally approximates the input units and output units of the production process; its procedures are similar to those of the SFA. DFA does not; unlike SFA assume that errors in the model and inefficiencies in the production process can be separated. Indeed it assumes the overtime, the model does not have error, and hence the deviation between predictions and actual observations result from inefficient production processes. There are no restrictions on the distribution of inefficiency as long as the representative values are positive (Worthington, 2009). While TFA has the same challenges as SFA and DFA do, it is not associated with the provision of estimates on how a production process is efficient; instead, it offers a general view (Berger & Humphrey, 1997). When SFA and DFA are the only approaches available for analysing efficiency of DMU SFA is preferable due to the fact that the approach takes advantage of little industry knowledge required in order to determine good performers from others, or vice-versa (Beger & Humphrey, 1997: Worthington, 2009).

### **2.3.2 Non Parametric Approaches to Performance Measurement of Firms**

The two major non-parametric frameworks include the data envelopment analysis (DEA) and the free disposal hull (FDH). DEA entails the calculation of how efficient certain units are, when compared to how similar units perform. It derives a ratio comprising the output to which a weight has been attached, which is assessed in relation to the inputs that have been weighted. Units with a high level of efficiency then make up the relative frontier, which becomes the basis of evaluating whether other units are operating efficiently. The

designation of inputs and outputs is not constrained by specific rules. However, applying the DEA requires one to identify input units and output units that are meaningful when considered in the context of the DMUs under comparison. The DEA method determines how a decision making unit is efficient through the maximization of how output units compare to the input units, with the condition that a decision making unit should not have a ratio larger than one, ultimately each DMU's efficiency scores fall within the range of zero and one. In the output –oriented method, the determination of efficiency scores requires one to hold inputs units constant, and at the same time, examine the potential for improvement in the outputs. The input–oriented DEA is not different from the approach with an output orientation, save for the fact that the aim is to minimize how the input units relate to the output units, subject to the constraint of ensuring that the ratios for every DMU does not fall below one (Berger & Mester 1997; Berger & Humphrey, 1997). FDH is the same as the DEA approach and constitutes a more general alternative of the DEA. Although the DEA has an assumption of economic connectivity, the FDH fails to do so. It however needs additional data for the significance and insightfulness of the outcome. In comparison to DEA, FDH yields bigger estimations of efficiency; the two methods are frontier approaches for establishing the highest level of technical efficiency (Berger & Humphrey 1997; Worthington, 2009).

### **2.3.3 Parametric Versus Non-Parametric Approaches**

Non-parametric approaches generally show higher inefficiency levels than parametric ones (Gual & Clemente, 1999). This is due to the fact that for each output /input combinations, a DMU is compared with the best in the sample. The non –parametric approaches seek to assess efficiency of a DMU relative to other firms in the same industry. It is therefore not

a requirement to define a production function. All deviations from efficient frontier are assumed to be the result of inefficiency. However, the non-parametric approaches ignore that some of the deviations from the efficient frontier could be the result of model misspecification, or measurement error or environmental factors. This may result in misstatement of inefficiency. A key advantage of the parametric approach like SFA is that little industry knowledge is required in order to determine good performers from others, or vice-versa (Beger & Humphrey, 1997: Worthington, 2009).

The parametric approaches specify a production function and relates expected output to various inputs. The difference between the actual output and the model predicted outputs are attributed to model error or inefficiency. The greatest challenge to using the parametric approach is the need to define a production function for the units being analysed. It is difficult to determine the optimal combination of inputs that are required to produce given outputs in an industry (Worthington, 2009).

This study applied the stochastic frontier technique/approach (SFT/A) to measure firm efficiencies in order to take care of deviations from the efficient frontier which could have resulted from the model misspecification, or measurement error or environmental factors leading to misstatement of inefficiency. Further the approach took advantage of little industry knowledge required in order to determine good performers from others, or vice-versa (Beger & Humphrey, 1997: Worthington, 2009). Additionally the justification in the use of SFA was also demonstrated by Aigner, Lovell, and Schmidt (1977), Berger and Mester (1997b) and Fiorentino, Karmann, Koetter (2006).

Aigner, Lovell, and Schmidt (1977) proposed stochastic cost frontier in analysis of cost efficiency of commercial banks. In general, the non-parametric methods are less suitable because they assume away noise in the data and luck. But for the purpose of this study, the most important drawback is that these methods generally ignored prices and, thus, can only account for technical inefficiency related to using excessive inputs or producing suboptimal output levels.

As Berger and Mester (1997b) observed, these methods cannot compare firms that tend to specialize in different inputs or outputs because it is impossible to compare input and output configurations without the benefit of relative prices. Moreover, Berger and Mester (1997b) used the distribution-free approach as well as the stochastic frontier approach for both the translog and the Fourier specification of the cost and profit function. They concluded that the empirical findings in terms of either average industry efficiency or ranking of individual bank are similar across methods.

Fiorentino, Karmann, Koetter (2006) investigated the consistency of efficiency scores derived with two competing frontier methods in the financial economics literature namely: Stochastic Frontier and Data Envelopment Analysis. They sampled 34,192 observations for all German universal banks and analyzed whether efficiency measures yield consistent results according to five criteria between 1993 and 2004: levels, rankings, identification of extreme performers, stability over time and correlation to standard accounting-based measures of performance. They found that non-parametric methods are particularly sensitive to measurement error and outliers. Furthermore, their results showed that accounting for systematic differences among commercial, cooperative and savings banks is important to avoid misinterpretation about the status of efficiency of the total banking

sector. On the basis of the above justifications this study adopted Stochastic Frontier Approach (SFA) to measure firm efficiency which prior studies by Nickell et al., 1997; Nickell & Daphne, 1999 and Isiki & Hassan, 2002 had indicated to have a linkage to the value of the firm .

## **2.4 Review of Empirical Literature**

This part looks at the literature reviewed on the relationship between capital structure and firm value, the moderating role of macroeconomic environment, the mediating influence of firm efficiency and the joint effects of capital structure, macroeconomic environment and firm efficiency on the value of the firm.

### **2.4.1 Capital Structure and Firm Value**

The empirical literature review on the influence of capital structure on firm value has found mixed findings ranging from positive by Holz (2002) who found that capital structure (debt ratio) has a positive relation with financial outcomes in terms of return to the owners of the firm (ROE) and return on the assets owned by the firm (ROA). The results suggest the willingness of the managerial team to fund investment projects through borrowing, with the proceeds of debt being applied in the maximization of firm performance and value. Dessi and Robertson (2003) on the other hand found a positive impact of debt on the performance and value of business enterprises. Dalbor et al. (2007) on the other hand established that, keeping organizational size and risk constant, the return on assets of lodging firms had a negative relation to their value, with capital expenditures lacking a significant relation to the value of the firms.



Rayan (2008) found an inverse relation between the use of debt and value of the firms listed at the Johannesburg Stock Exchange, with differences existing across various industries; these findings were consistent with Hutchinson's (1995) argument on the mediating role of interest expenses in the link between capital structure and firm performance.

On the contrary, other studies found a negative relation in firm performance and value, that capital structure related negatively with firm performance and value. Majumdar and Chibber (1997) concluded that debt ratios in the firm capital structure inversely influence firms' performance and value; shareholders were restricted from paying dividends by the creditors. Abor (2005) and Abor and Biekpe (2007) noted a negative and statistically substantial effect of capital structure on value and performance of a business.

An investigation into the relationship between leverage, profitability and firm value of listed firms in Kenya by Kodongo, Mokoteli and Mwangi (2014) using various panel procedures found reasonably strong evidence that leverage significantly, and negatively affected profitability of listed firms in Kenya. However, leverage has no effect on Tobin Q, the proxy for firm value. Similar findings were reported by Mwangi, Makau and Kosimbei (2014) in their investigation of the relationship between capital structures and the performance of non-financial companies listed at the Nairobi Securities Exchange (NSE). Their study employed an explanatory non-experimental research design using panel data for the period 2007-2012. The study revealed that financial leverage had a statistically significant negative relationship with performance as measured by return on assets (ROA) and return on equity (ROE). Contrarily Weill (2007) documented a positive impact of financial leverage on Spanish and Italian firms, whereas German, French, and Belgian companies experienced a negative impact from using debt.

The above empirical review considered either the influence of debt or equity on the value of the firm and did not consider the combined effects of debts and equity capital capital on the value of the firms.

#### **2.4.2 Capital Structure, Macroeconomic Environment and Firm Value**

Previous empirical researches focused on capital structure and the value of the firm found that firm value are not only influenced by capital structure choices but by firm other factors both within and outside (Booth, Aivazia, Kunt & Makaimovi, 2001).

Fanelli and Keifman (2002) found that an unstable Argentinian macroeconomic environment and external factors had a profound impact on the financial decisions of business enterprises. They also argue that companies should only issue bonds when the economic situation is ideal because during the given periods the firms are able to issue bonds at favourable terms, which affects their earnings and market value of the firm shares.

Similarly, McConnell and Servaes (1995) in their study of the effect of macroeconomic environment on the connection amid capital structure and company value concluded that the influence of debt on firm value depended on the growth opportunities that are related to the GDP growth rate of the country. The results of their study found that there was an inverse relationship between the scope of growth opportunities and how debt is linked to the value of a firm. Songshin and Adrian (2009) recommended that due consideration should be given to external factors when making decisions on the optimal mix of debt and equity; their research showed a negative relation between macroeconomic indicators and the capital structure of European firms.

Cheng and Tzeng's (2011) study revealed that Taiwanese firms with debt had a higher value than those without debt; the financial quality of a firm played a considerable role in mediating this relation. A similar study by Rao, Hamed, Al-yee and Syed (2007) established an inverse relation between capital structure and the financial outcomes of the operations of firms in Oman. Tax savings had little impact considering the costs of borrowing funds in the Oman market, and the insufficient level of activities in the financial markets.

The current study differs from empirical literature reviewed above by MaConnel and Servaes,(1995) Fanelli and Keifman, (2002), Songshin and Adrian, (2008) and Cheng and Tzeng's ,(2011) in that these researches considered only two variables ,either the influence of macroeconomic variables on the firm value or the influence of macroeconomic variables on the firm value or the reverse , the researcher in this study considered the joint influence of capital structure and macroeconomic variables on the value of the firms.

The above empirical literature considered pairwise relationship between either capital structure and macroeconomic environment factors or between capital structure and the value of firms. None of the studies reviewed considered the the moderating influence of the macroeconomic environment on the relationship between capital structure and firm value

### **2.4.3 Capital Structure, Firm efficiency and Firm Value**

Many studies on macroeconomic growth have demonstrated that gross country differences in growth of GDP per capita are due to growth in total factor productivity (TFP) (Hall and Jones, 1999; Easterly and Levine, 2001). Therefore, it is interesting to inquire whether finance influences firm growth and market value through its impact on the efficiency of

the firm. This could be the case if the financial markets are able to supply capital to firms and monitor them to achieve efficiency (Ayyagari, et al., 2007).

Several studies have examined the performance implications of efficiency measures and/or efficiency changes using frontier analysis. Greene and Segal (2004) argue that “cost inefficiency affects profits and growth through the negative effect of wasted resources on earnings and cash flows.” This implies that more operationally efficient firms should be more profitable. Greene and Segal, (2004) used SFA and documented a contemporary association between profitability (ROE and ROA) and efficiency in the US life insurance industry. Cummins and Xie (2008) on the other hand used DEA and indicated a positive relation between firm efficiency and stock market reactions to acquisitions and divestitures in the US property – liability insurance Industry.

Fenn, Drakos, Andrews and Knox (2008) conducted a more broadly research on efficiency for a large sample of European manufacturing companies including food and chemicals manufacturers. Their results show that efficiency scores and volatility of operational cost and profit are meaningfully influenced by the size and market share of individual companies. Noting that, most efficiency investigations in manufacturing industry are focused on technical, allocative and cost efficiency.

Beccauli, Casu and Girardone, (2002) examined the relationship between estimated banks’ efficiencies and their share prices. They investigated the influence of X efficiency on the share price of banks in five European markets in year 2000. Data Envelopment Analysis (DEA) and Stochastic Frontier Analysis (SFA) have been applied to measure the cost efficiency of banks by taking a sample of European Banks listed in the year 2000. Stock

performance of each bank has been regressed on early change of frontier change measures. The results suggested that change in banks' share price reflect percentage changes in cost efficiency and the stocks of cost efficient banks tend to outperform their inefficient counterparts.

William and Segal (2004) examined the linkage of cost inefficiency and cross – sectional variation in firm profitability in the US life insurance industry. Investigation has been made on the relationship between organizational form, inefficiency in the life insurance industry is substantial relative to profitability and that inefficiency is negatively associated with profitability measures such as the return on equity. The analysis of inefficiency and organizational form suggested that stock (shareholder – owned) companies. Additionally Iommidis, Molyneux and Pasioura (2007) examined the relationship between bank efficiency change and stock price returns. The impact of cost and profit efficiency on stock return has been tested on a sample of 260 banks operating in 19 Asian and Latin American countries between 2000 and 2006. The results represented a positive and robust relationship between profit efficiency changes and stock returns has been applied. The result revealed that profit efficiency better explains bank stock returns compared to traditional accounting profits measures (ROE) and profit efficiency measures include useful information for shareholders wishing to explain bank stock returns.

Olena (2004) investigated the efficiency of Polish banks during the period of 1998-2000. A Data Envelopment Analysis (DEA) methodology was applied which allowed for distinguishing between five different types of efficiency namely: cost, allocative, technical, pure technical, and scale. Additionally, Olena performed a number of parametric and non-parametric tests to test whether foreign and domestic banks come from the same population. Finally, univariate and multivariate regression analysis was employed in order

to detect the determinants of banking efficiency in Poland. The tests performed rejected the null hypothesis that all banks come from the same population and thus all the results were reported under the assumption of separate efficiency frontiers for foreign and domestic banks. Over the study's sample period, it was established that average efficiency was 44.62% and 69.70% for domestic and foreign banks, respectively. Foreign banks exhibited higher productivity of their inputs (technical efficiency) and were superior in choosing the right mix of inputs in light of given prices (allocative efficiency). The study concluded that foreign banks managed to utilize their comparative advantage and showed a higher level of efficiency. This superiority should not be attributed to foreign ownership per se. Instead, it is explained by better output quality, higher skilled personnel, and more advanced technology. Thus, Olena (2004) added to the evidence that opening banking markets to foreign capital fosters competition and adds to the efficiency of the banking industry and market value of those banks.

Berger and Mester (1997a) studied the sources of differences in bank efficiency by applying different efficiency concepts, different measurement methods, and different potential correlates of efficiency to the same data set. They compared bank efficiency and productivity change between the last six years of the 1980s and the first six years of the 1990s. Their data set included annual information from 1984 through 1995 on virtually all U.S. commercial banks- totaling to over 145,000 annual bank observations in all. Their findings suggested that each of three efficiency concepts -cost, standard profit, and alternative profit efficiency - adds some independent informational value. The efficiency results were remarkably robust to the different measurement techniques, different functional forms, and various treatments of output quality used. Treatment of equity capital was found to be an important consideration

Schumpeter (1934) studies on innovating firm production processes in United Kingdom found businesses that are continually involved in creative and innovative practices are predisposed to lasting success while those who do not, expose themselves to risk. Further Artz, Norman, Hatfield and Cardinal, (2010) argued that increased competition and shorter life cycles of products made innovation an integral issue for the performance of firms. Similarly, in today's intense competitive environment it is not surprising to find technological innovations being a requisite objective for all firms and that there are vulnerabilities from changes in the preferences of customers, augmented global rivalry and shorter product lifecycles. Conventionally, all businesses ought to be innovative to boost efficiencies despite their financing, industries and sizes in order to enable the businesses battle-out with other businesses and sustain their operations (Lipit , 2006 ). The empirical results were also supported by Nickell et al (1997) and Nickell and Daphne (1999) who observed a positive relationship between indebtedness and total factor productivity (TFP) in the United Kingdom

However, other studies have reported a negative relationship between capital structure and firm productivity. Pushner (1995) found negative effect of leverage on firm performance measured as total factor productivity (TFP) in Japan. Booth et al (2001) in their study of 10 developing countries found a negative relation between leverage and firm performance and firm value. Onaolapo and Kajola (2010) found a significant negative impact of leverage on financial measures of firm performance in Nigeria.

There is a divergence of the studies reviewed above with the current study for example Demerjian et al (2009) used a large sample of firms across industries and demonstrates that managerial ability scores derived from DEA are positively and significantly associated

with current and past stock returns, executive compensation and investment opportunities. Although the current study estimation method and the choice of output and input variables are similar to those of Demerjian et al (2009), there are important differences between the current study in that the current study performed a comprehensive examination of the linkage of firm efficiency in terms of operations, cost and profit efficiencies on the relationship between capital structure, and firm value that includes examining the predictive power of changes in frontier analysis measures for changes in current and future earnings per share and market share price, as well as examining whether investors and analyst impound the predictive information to final market share price of the firm shares . In contrast, Demerjian et al (2009) test whether efficiency is related to current and past returns. Another important difference is that the current study used SFA in measuring firm efficiency while Demerjian et al (2009) focused on DEA.

Further Demerjian et al (2009) used a levels design, while the current study used a changes design. Using a changes design is important because it mitigates the potential issues of endogeneity and correlated omitted variables and is consistent with prior research which indicates that changes in efficiency are related to performances (Soliman, 2008). Additionally current study also differ in that, the researcher used a firm – level measure of efficiency, while Demerjian et al (2009) used a manager – level measure of efficiency. This is important because the current study is interested in how a firm efficiency is related to performance and value, while Demerjian et al. (2009) were interested in how CEO's ability related to firm performance.



The above empirical literature considered pairwise relationship between either capital structure and firm's efficiency or between capital structure and the value of firms. None of the studies reviewed considered the the intervening influence of the firm's efficiency on the relationship between capital structure and firm value

#### **2.4.4 Capital Structure, Economic Environment, Firm efficiency and Value**

The current studies hypothesis that capital structure, macroeconomic environment and firm efficiency have a strategic impact and significantly contributes to firm value. Empirical studies on capital structure and firm value have shown that there is a relationship between the two. However, the direction of the relationships depended on the variables used by the model hence the need to recognise the role being played by macroeconomic environment and firm efficiency in the relationships.

However none of the studies have attempted to assess the joint effects of capital structure, macro-economic environment, firm's efficiency and firm value together but instead there has been pairwise influence either between capital structure and firm value, macroeconomic environment and firm value, firm efficiency and firm value or between capital structure and firm efficiency or the reverse. This forms the gaps of this study whereby the influence of capital structure, macroeconomic environment, firm efficiency and value are assessed together.

#### **2.5 Summary of Literature and the Knowledge Gaps**

The empirical analysis of relationship between capital structure, macroeconomic environment, firm efficiency, and firm value has yet to provide a convincing causal link among these variables. A reasonable conclusion, based on the previous research, is that capital structure matters in relation to firm value. It can also be concluded that capital

structure affects firm value through the debt component of capital structure due to tax shield advantage which is meant to protect firm profit from taxation enhancing the firm market value (Modigliani & Miller, 1958).

A number of conceptual, contextual and methodological research gaps arose from the analysis of the issues examined in this chapter. The contextual gap arises from the fact that capital structure concept has largely been studied in developing countries and understudied in Kenya a developing country and at a level addressed by this study. The conceptual gaps include lack of consensus and inconsistencies on the influence of capital structure on the value of the firms with some studies indicating positive and negative influences and others no influence at all, making the study on the relationship between capital structure and firm value inconclusive.

Another conceptual gap is that most studies on the firm value have not controlled for any intervening or moderating variable. If variables such as the differences in firm efficiency and macroeconomic environment are introduced in the model, then the link amid capital status and organizational wealth may be different. This research introduces firm efficiency with respect to operational, cost and profit efficiencies as an intervening variable and macroeconomic environment with respect GDP growth, inflation and interest rate as a moderating variable in an effort to explain further the association amid capital constitution and firm value. A major limitation with most of the researches undertaken so far is that they considered only two of the variables under study (capital structure, and firm value, macroeconomic environment and firm value or firm efficiency, and firm value or the reverse) at a time. No single research has considered the effects of the four variables taken together. This study has tested whether capital structure, macroeconomic environment,

firm efficiency jointly have a significant influence on the wealth of businesses trading shares at the NSE.

The methodological gap addressed by this study arises from the fact that traditional financial analysis methods mainly used in the previous studies measured firm financial performance and value using earnings per share, price earnings ratio, Return on Equity(ROE), Return on Assets (ROA), Earnings Value Added (EVA), and Operating profit Margin. The above measures of firm value can be manipulated by management and therefore fail to sufficiently measure firm performance and value unlike market share price used in the current study which is information driven (market perception value ) by factors related to firm's financing strategies, efficiencies and macroeconomic environment existed in the past and anticipated into the future. Additional methodological difference between the above empirical studies and the current study was that panel data scrutiny aided in assessing the extent to which the dependent variable is a function of different independent variables in the current study. This is in contrast with some of the previous studies which employed a simple pooled ordinary least squares regression analysis methodology, thereby ignoring the time dimension of the data. In situations where the panel data did not meet the assumption of regression analysis of no autocorrelation, analysis was conducted by fitting a Prais Winsten Panel Regression model which is robust for serial correlation. Likewise, corrected standard errors were utilized in instances where the assumption of no heteroscedasticity was violated. Diagnostic testing, which was largely ignored in previous studies, and the consequential remedial measures helped the researcher to enhance the credibility of the results.

Table 2.1 below is summary of the review of prior researches on the study variables of capital structure, macroeconomic environment, firm efficiency and value of firms. For each of the study the results, research gaps and how the current study addresses these gaps have been shown.

**Table 2.1: Summary of Literature and Knowledge Gaps**

<b>Empirical studies</b>	<b>Design and Focus</b>	<b>Methodology</b>	<b>Findings</b>	<b>Gaps</b>	<b>Focus of current study</b>
McConnell & Servaes (1995)	Investigation of influence of debt on the firm value.	-Cross sectional survey was used. -Simple pooled ordinary least regression analysis was used	The influence of debt on firm value depended on the presence of growth opportunities.	The study only used cross sectional survey and ignored time dimension of the data .Additionally the study considered only the internal aspects of the relationship between debt and firm value.	The study used Panel data regression analysis which considered time dimension of the data and considered the effects of both internal and external factors of the firm in the relationship between capital structure and the firm value.
Majumdar & Chibber (1997)	Investigated the relationship between capital structure and firm value.	-Cross sectional analysis and two stage least square (2SLS) was used.	There was a negative relationship between capital structure and firm value.	The study failed to consider other interventions in the relationship between capital structure and the value of the firm and used cross section analysis method of data analysis	The study considered the effect of macroeconomic environment and firm efficiency in the relationship between firm leverage and value and used Panell data regression analysis which considered time dimensions of the data
Kiogora (2000)	Investigation of the relationship between returns of firms quoted on the NSE and their level of leverage	-Cross sectional survey was used simple pooled ordinary least. -Regression analysis was used	There was a negative relationship between the returns and level of firm leverage.	The study used cross section survey method of data analysis and failed to consider other factors in the relationship between firm returns and leverage.	The current study used Panel data regression analysis considering time dimension of the data alongside the influence of macroeconomic forces and effects of firms' efficiency in the relationship between firm capital structure and value.
Beccauli,Casu and Girardone (2000)	Examination of the relationship between estimated bank efficiency and their share prices in five European markets for year 2000	Cross sectional research design was used to assess the efficiency of profitability on the value of European banks in five key markets by use of Data Envelope Analysis (DEA)	Change in banks share price reflects percentage change in cost efficiency, and the stocks of cost efficiency tend to output their efficient counterparts.	The study considers data for only one year hence it was not possible to conduct trend analysis of efficiency measurement. Additionally the study only considered relative efficiency without considering absolute efficiency.	The current study considered a period of six years for the purpose of developing a trend analysis and consider time dimension of the data in order to consider the effects of profitability on firms share price. Further the study used Stochastic Frontier Analysis to measure the efficiency of firm profitability on value of the firm.

<b>Empirical studies</b>	<b>Design and Focus</b>	<b>Methodology</b>	<b>Findings</b>	<b>Gaps</b>	<b>Focus of current study</b>
Holz (2002)	Investigated the relationship between debt ratio and the value of the firm	-Cross sectional survey was used. -Simple pooled ordinary least Regression analysis was used	There was a relationship between the debt ratio and the value of the firm.	The study considered only one aspect of capital structure and failed to consider the influence of equity on the value of the firm.	The study links both cost of debt and equity to the value of the firm and considered other interventions in the relationship and further considered time dimension of the data to analyse the data.
Dessi& Robertson (2003)	Investigations into the relationship between capital structure and performance.	-Cross sectional survey was used. -Regression analysis was used	There was a Positive relationship between financial leverage and performance over an average period of five years.	The study failed to investigate the influence of both debt and equity in the relationship. Further the study did not consider other variables in the relationship and used cross sectional survey method in analysing the data.	The study investigated the influence of the both debt and equity and other interventions and used both cross sectional and longitudinal analysis to analyse the data set.
Cho and Pucik (2005)	Determination of the effects of profitability on the market value of US insurance companies	Effects of profitability efficiency on firm value was measured by use Data Envelope Analysis (DEA) using a sample of 228 largest insurance companies in US	Profitability has a significant and positive effect on the firm market value for US firms	The efficiency of profitability effect on the firm value was measured by use of DEA method which only concentrated on the relative efficiency without considering the absolute efficiency	The current study utilized Panel data regression analysis considering time dimension of the data and used Stochastic Frontier Approach (SFA) in order to consider the absolute efficiency of profitability on the value of the firms.
Cummins and Rubio-Misas (2006)	Estimated technical, allocative and cost efficiency in measuring total factor productivity.	Cross sectional survey to measure Efficiency was used using Data Envelope Analysis (DEA) in order to measure total factor productivity change by Malmquist analysis	Consolidation has a positive effect on both total factor productivity and the number of insurance companies operating with decreasing return to scale	The measurement method used lacked the capacity to measure absolute efficiency and instead measured relative efficiency	The current study utilized Panel data regression analysis considering time dimension of the data using Stochastic Frontier Approach in order to measure absolute efficiency
Iommidis, Molyneux and Pasoura (2007)	Examination of the relationship between bank efficiency change and stock price returns.	Cross section survey was used utilizing Data Envelope Analysis (DEA) in measuring efficiency of profitability in influencing firm stock prices	Opposite and robust relationship between profit efficiency changes and stock returns and profit netter explains bank stock returns compared to traditional accounting profit measures.	The measurement method only considered relative efficiency and did not consider absolute efficiency	The current study utilized Panel data regression analysis considering time dimension of the data and used Stochastic Frontier Approach(SFA) in measuring efficiency of profitability on the firm value

<b>Empirical studies</b>	<b>Design and Focus</b>	<b>Methodology</b>	<b>Findings</b>	<b>Gaps</b>	<b>Focus of current study</b>
Aboret al(2007)	Investigations into financing preference of managers of different nations	-Longitudinal and cross sectional survey for 5 years was used. -Multi-Regression analysis was used	There is no preference of financing which is identical to all the nations.	The study failed to relate the preference of financing method to the unique situations of the firm and resultant value of the firm.	The study used longitudinal survey and linked the manager's preference of financing to the firm unique situations and external environment and the resultant value of the firm.
Aggarwal& Zhao (2007)	The impact of leverage on firm value of both high and growth firms over a period of five years.	Cross section survey was used and Ordinary least square Regression analysis was used.	Test of correlation between leverage and firm value was positive.	The study did not consider the influence of macroeconomic environment and firm efficiency in the relationship between capital structure and firm value.	The study examined the influence of macroeconomic environment and firm efficiency on the relationship between leverage and firm value and additionally used Panel data regression analysis considering time dimension of the data in analysing the data sets
Rao, Hamed, Al- yee& Syed (2007)	Investigated the relationship between capital structure and firm performance	Cross section survey was used.and Ordinary least square Regression analysis was used	There was inverse relationship between capital structure and firm performance	The study failed to consider other interventions in the relationship between capital structure and performance of the firm	The study considered the effect of macroeconomic forces and firm efficiency in the relationship between firm leverage and value. Further Panel data regression analysis considering time dimension of data was used in analysing the data.
Fenn, Drakos, Andrews and Knox (2008)	Conducted a research on efficiency for large sample of European insurance companies including banking and investment companies	Efficiency was measured by use Data Envelope Analysis (DEA)	Efficiency scores and volatility of operational cost and profit are meaningfully influenced by the size and market share of individual companies	The study applied a relative efficiency measurement and ignored absolute measurement of efficiency.	The current study use Stochastic Frontier Approach in order to capture the absolute measure of efficiency
Rayan (2008)	The study investigated whether capital structure positively influences the value of the firm.	Longitudinal survey design for 10 years was used. Multi-Linear regression was used	There was an inverse relationship between financial leverage and firm value.	The study did not consider the influence of macroeconomic environment and firm efficiency in the relationship between leverage and firm value.	The current study considered the influence of macroeconomic environment and firm efficiency in the relationship between leverage and firm value.

<b>Empirical studies</b>	<b>Design and Focus</b>	<b>Methodology</b>	<b>Findings</b>	<b>Gaps</b>	<b>Focus of current study</b>
Adeyemi et al , (2011)	The study examined perceived relationship between corporate capital structure and firm value in Nigeria	Chi-Square was used to draw inferences of perceived relationship between capital structure and firm value	There was a positive significant relationship between firm choice of capital structure and firm value	The study considered only direct relationship of the two variables that is capital structure and firm value and did not consider any interventions or moderators in the relationship.	The current study considered the influences of macroeconomic forces and firm efficiency in the relationship between capital structure and firm value
Kadongo, Makoteli and Maina, 2014	The study examined capital structure, profitability and firms value listed in Kenyan NSE	The study applied panel data models using Generalised Least Square (FGLS) regression analysis	The study found reasonably strong evidence that leverage significantly and negatively affects profitability and value of listed firms in Kenya.	The study failed to build consensus on the right or optimum level of debt to employ to maximize value for firm owners. Further the study considered only one aspect of capital structure (debts) and did not consider other factors in the relationship between debt and firm value	The current study considered the effects of both debt and equity and further considered the influence of macroeconomic forces and firm efficiency in the relationship between capital structure and firm value and analysed the data by use of panel data regression analysis considering time dimension of the data.
Mwangi , Makau and Kosimbei (2014)	The study investigated the relationship between capital structure and performance of non-financial companies listed at the Nairobi Securities Exchange	The study applied panel data models (random effects) feasible Generalised Least Square (FGLS) regression analysis.	Financial leverage had statically significant negative association with performance as measured by return on assets and equity	The study considered only the direct relationship between the two variables without any considerations of macroeconomic environment and firm efficiency. Further the study considered performance only with respect to return on assets and equity without regard to final market value of the firm.	The current study considered the influences of macroeconomic environment and firm efficiency in the relationship between capital structure and the resulting market value of the firm which is a robust measure of firm value.

**Source: Author 2016**



## **2.6 Conceptual Framework**

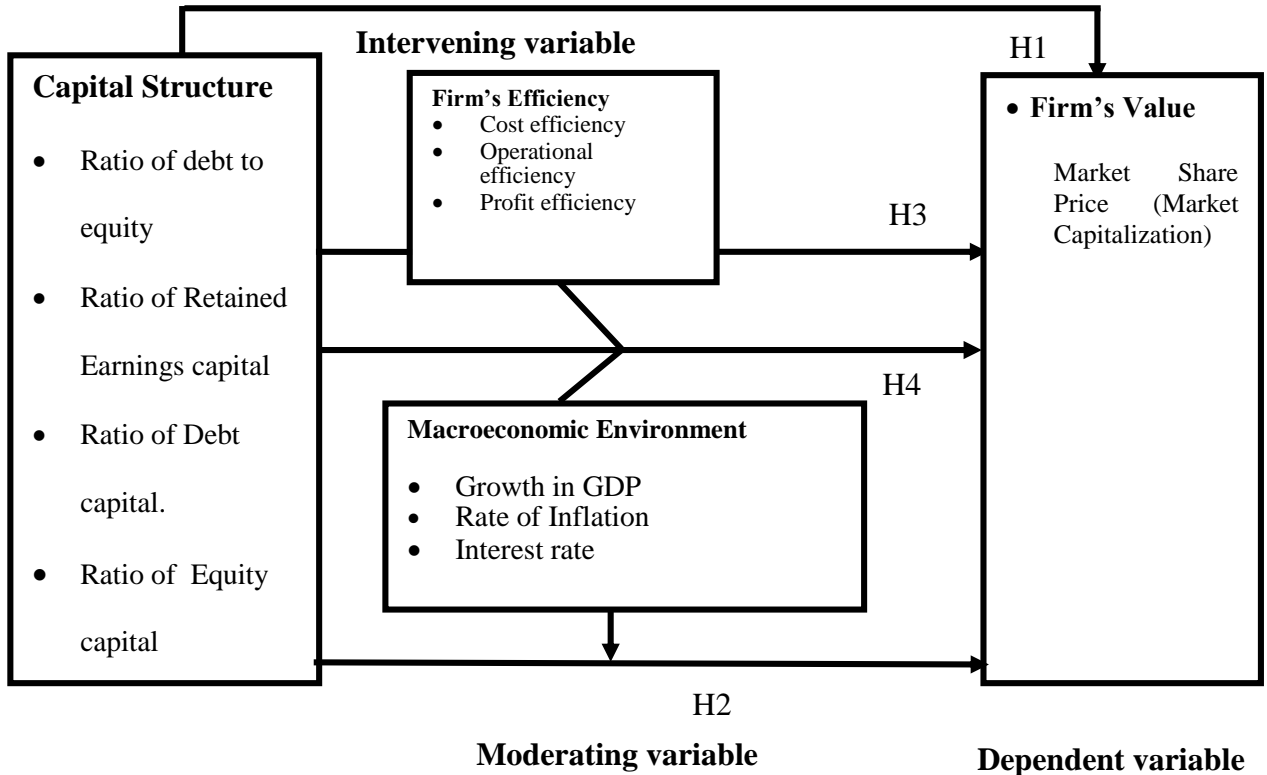
This study adopts MM theory of capital structure, resource based and transaction cost/ economic theories in determining the relationship among capital structure, macroeconomic environment, firm efficiency and value of firms listed at the Nairobi Securities Exchange. The study has been anchored on MM theory of capital structure due to its proposition on market efficiency and inefficiency with regard to information symmetry and asymmetry and the associated benefits and costs and its impact on the value of the firm. The aim is to determine whether the theory holds even when macroeconomic environment factors and firm efficiency are introduced. A discussion of the dependent, independent, moderating and intervening variables is undertaken followed by the conceptual model and the research hypotheses.

The dependent variable in this study is the firm value measured by market Share Price (MSP) in accordance with Rayan, (2008); Adeyemi et al. (2011) and Kadongo et al. (2014). The independent variable is capital structure measured by debt equity ratio ,ratio of retained earnings, ratio of equity and ratio of debt capital in accordance with Desi & Robertson, (2003): Brealey & Myers,(2008): Inanga and Ajayi, (1999) and Modigliani & Miller, (1958,1963).

Firm efficiency considered as the intervening variable measured by cost efficiency, operational efficiency and profit efficiency based on Green and Dan Segal, (2004) and Robio-Misas, (2006) and Isik & Hassan, (2007). While macro-economic environment as the moderator measured by interest rate, Growth in GDP and rate of inflation based on Drobetz and Wanzenried (2006); Graham and Harvey (1999). The relationship between capital structure and firm value is assumed to be moderated by the macroeconomic

environment and intervened by firm efficiency. These relationships are captured in the schematic conceptual model in figure 2.1 depicting the conceptual framework for the study.

**Figure 2.1: Conceptual Model**



The following null hypotheses were formulated and tested for firms listed at the NSE:

- H<sub>01</sub>: Capital structure does not significantly influence the value of the firm.
- H<sub>02</sub>: Macroeconomic environment does not significantly moderate the relationship between capital structure and value of firms.
- H<sub>03</sub>: Firm efficiency do not significantly intervene in the relationship between capital structure and value of firms.
- H<sub>04</sub>: Capital structure, macroeconomic environment and firm efficiency do not jointly and significantly influence the value of firms.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This section describes the activities that were adopted in executing the research. Section 3.2 presents the research philosophy while section 3.3 discusses the research model. Section 3.4 presents the research's population; section 3.5 discusses the study sample while section 3.6 discusses the data collection instruments. Section 3.7 discusses the diagnostic tests which includes tests for multicollinearity, serial correlation, heteroscedasticity and panel level stationarity. Section 3.8 discusses operationalization of research variables and measurements while section 3.9 discusses data analysis concluding with data analysis techniques.

#### **3.2 Research Philosophy**

Philosophy of science which is at the centre of knowledge development is pegged on researcher's views or perceptions of what the world entails (Saunders, Lewis & Thornbill, 2007). There are two main research philosophies used in social science research, namely Positivism and phenomenology. Positivism is based on use of statistical and quantifiable computations of sampled variables to enhance formation of generalizations about some variable (Johnson & Christensen, 2010). Positivism is premised on the conjecture that the researcher is objective and thus independent of the variables being investigated rather than being inferred subjectively (Mugenda & Mugenda, 2003). In phenomenology the researcher does not only interact with what is being measured, reaches conclusions through personalized assessment and interpretation of what he or she sees and draws from them (Saunders et al., 2007).

Positivism is based on real facts, neutrality of the researcher, objective measurements of the variables and validity of results. Saunders et al. (2007) pointed out that positivism adopts a natural science stance where phenomena are objectively observed/measured leading to production of credible data. This study is anchored on positivistic philosophy because it sought to examine various theories. It equally sought to objectively establish facts empirically and establish relationships among variables through statistical methods. Hypothesis formulated in this study, were thus tested and confirmed or rejected through statistical methods leading to recommendations as per the findings.

### **3.3 Research Design**

Research design is the strategy or plan, used to acquire respondents. It also entails the method of collecting data from them to draw conclusions about the study at hand (Zikmund et al., 2010). There are three basic types of research design: exploratory, causal and descriptive. Descriptive designs involve three main methods namely survey studies, the correlation studies, and developmental studies (Cooper & Schindler, 2003). Descriptive designs can also be categorized either as cross-sectional which involves drawing a sample of elements from the population of interest and measuring efficiency of the elements only once or longitudinal where sample members are measured repeatedly over time (Sekaran, 1992).

The study used descriptive and correlation longitudinal research design. A longitudinal research is conducted over long time (could be decades). Descriptive longitudinal research design is preferred where timescales are more generous. In this form of research, an aspect is observed iteratively. The research entailed collecting published annual reports from organization listed at the Nairobi Securities Exchange and were actively operational from

2009 to 2014. This period was chosen subject to data availability constraints. It also utilized secondary data from the Nairobi Securities Exchange, Central Bank of Kenya (CBK), Kenya National Bureau of Statistics (KNBS) NSE listed company's reports and handbooks. Reliability of data collected was enhanced by using audited financial annual reports from selected organizations.

### **3.4 Population of the Study**

The population for this research involved 62 companies listed on NSE between 2009 and 2014. The period was chosen as suitable as it offers current information as previous researches by Mwangi, Makau and Kosimbei (2014) used data from year 2007 to 2012 and the capital funding behaviour may have varied over the years.

### **3.5 Sample of the Study**

The number of firm targeted for data analysis was 42 firms out of 62 companies quoted on the NSE. Following the preceding research by Ozkan (2001), Flanery and Rangan (2006) all the 20 companies in the financial segment were not included in the research as their capital structures are highly regulated by various statutes and their financing structure is different from non-financial institutions. The 20 firms entail insurance firms, banks, and investment companies. There was no continuous data for Uchumi Supermarkets and Hutchings Biemer Ltd since they were on suspension then. The two firms and another 10 firms where it was not possible to obtain data for six years were therefore excluded.

### **3.6 Data and Data Collection Instruments**

The study collected secondary data from annual performance reports of the firms listed at the Nairobi Securities Exchange. Additionally information on macroeconomic environment in relation to interest, inflation and economic growth rates were extracted

from Nairobi Securities Exchange (NSE) Central Bank of Kenya (CBK) and Kenya National Bureau of Statistics (KNBS) reports and hand books. The data extracted from firms listed at the NSE included turnover, administrative costs, distribution costs, finance costs, taxation costs, and profit after tax, number of equity shares, earnings per share, market price of a share of firms listed at the Nairobi Securities Exchange for the period of six years (2009-2014).

The study used data collection form (Appendix I) to collect the data. By taking a longitudinal approach, the study measured how the identified problems are improved, worsened or otherwise changed while determining the influence of macroeconomic environment and firm efficiency on the relationship between capital structure and value of the firms listed at the NSE. This is thus an indication of the accuracy of our prediction.

### **3.7 Diagnostic Testing**

Diagnostic tests are pre estimation procedures that evaluate whether the assumptions of Ordinary Least Squares (OLS) panel regression analysis are upheld. In particular, a strong linear relationship should not exist between any variables that are fitted jointly as regressors in a model (no multicollinearity), there should be panel level stationarity, error terms should be linearly independent (no autocorrelation), the variance of the error terms should be constant (no heteroscedasticity), and the error terms should be normally distributed (with a mean of zero and a constant variance). These assumptions and the particular tests that were used to test for each of them are discussed in detail below.

### **3.7.1 Tests for Multicollinearity**

The researcher used Variance inflation factors predictor variables to test multicollinearity. Variance inflation factors (VIF) assesses the extent of variance of the estimated regression coefficients relative to when these variables do not have a linear relationship.

### **3.7.2 Panel Level Stationarity**

In order to analyze data using panel regression models, it should be stationary. Non stationary data is likely to result in spurious regressions since mean and standard deviation estimates derived from such data will be non-constant. To test the data for stationarity, the Levin Lin Chu (LLC) Test unit root test was applied for all regression analyses of this study. The null hypothesis being that panels contain unit roots, whereas the alternative hypothesis implies stationarity in the panel data. Pertaining rejection criteria, the null hypothesis of a unit root is rejected if the p value of the LLC test is less than 5%.

### **3.7.3 Serial Correlation**

Serial correlation (also called autocorrelation) is a phenomenon which occurs when the error terms of regression variables for successive periods are correlated. When present in a dataset, it can distort the efficiency of regression estimators. Using the Wooldridge test for serial correlation; we tested this study's data for the presence of autocorrelation. The null hypothesis for this test is that there is no first order autocorrelation in the panels and is rejected if the p value of the test is less than 5%.

### **3.7.4 Likelihood Ratio Test for Heteroscedasticity**

Heteroscedasticity is a serious problem since it tends to inflate the standard errors, thereby increasing the probability of committing a type two errors, i.e. failing to reject a false hypothesis about a coefficient. The Likelihood Ratio test was used to test the panel data for heteroscedasticity. The null hypothesis of the Likelihood Ratio test is that the data is homoscedastic across entities, i.e. the error terms have a constant variance. If the null is rejected, the conclusion is that the data is heteroscedastic, i.e. the variance of error terms across entities is not constant. The rejection criteria is that the null of homoscedasticity is rejected if the p value of the Likelihood Ratio test is less than 5%.

### **3.7.5 Model Fitting**

Classic panel data analysis suggests that the Hausman specification test should be used to help the researcher in making a decision on whether to fit the random effects model or the fixed effects model. These two models assume that the data meets all the assumptions of regression analysis, i.e. no collinearity of regressors, no autocorrelation, and that the error terms are normally distributed with a mean of 0 and a constant variance, i.e. no heteroscedasticity. In instances where there are multicollinearity, the variable with the highest Variance Inflation Factor (VIF) should be excluded from further analysis. In cases of autocorrelation and heteroscedasticity, a Prais Winsten Panel Regression model should be fitted. This is because this model is robust enough to generate plausible results in the presence of these two violations of CLRM assumptions.



### **3.8 Operationalization of the Research Variables and Measurements**

The independent variable of study (capital structure) was operationalized as the debt to equity, ratio of retained earnings, debt capital and equity capital ratios as postulated by (Desi & Robertson, 2003). Macroeconomic environment was operationalized as interest rate, growth rate of GDP and inflation rate which is consistent with the study by (Cheng et al., 2010). The intervening variable, firm efficiency, was operationalized as Cost efficiency, operational efficiency and profit efficiency of the firm. This is consistent with the operationalization of studies by (Diacon et al., 2002; Greene & Dan Segal, 2004; Cummins & Rubio-Misas, 2006; Fenn et al., 2008). The dependent variable of this study, which is firm value, was measured by market share price (MSP) (Rayan, 2008); Adeyemi et al., 2011; Kadongo et al., 2014). The study variables are operationalized as shown in Table 3.1

**Table 3.1: Operationalization of Study Variables**

<b>Variables</b>	<b>Operational Indicator</b>	<b>Measurement</b>	<b>Operationalization</b>	<b>Supporting Literature</b>	<b>Item in the data collection form</b>
<b>INDEPENDENT VARIABLES : CAPITAL STRUCTURE</b>					
<b>Capital Structure</b>	Debt to Equity Ratio	Ratio Scale	The ratio of Debt to Equity in the firm capital structure.	Desi & Robertson (2003). Linh, (2014) Brealey & Myers (2008) Inanga & Ajayi, (1999). (Pandey, (1999) Modigliani & Miller (1958)	2A
	Ratio of Retained Earnings	Ratio scale	The ratio of R/E in the firm capital structure.		2B
	Ratio of Debt capital.	Ratio scale	The ratio of debt capital in the firm capital structure		2C
	Ratio of Equity capital	Ratio scale	The ratio of equity capital in the firm capital structure.		2D
<b>MODERATING VARIABLE MACROECONOMIC ENVIRONMENT</b>					
<b>Macroeconomic Environment</b>	Interest rate	Ratio scale	Rate of interest in the market at the end of year for the years covered by the study	Fama, & French, (2001) Drobetz & Wanzenried (2006) Graham & Harvey (1999) Drobetz & Wanzenried, (2006) Cheng et al., (2010)	3A
	Growth in GDP	Ratio scale	Rate of growth in relation to GDP at the end of the year for the years covered by the study.		3B
	Rate of Inflation	Ratio scale	Rate of inflation in the market at the end of the year for the years covered by the study		3C
<b>INTERVENING VARIABLE : FIRM SPECIFIC efficiency</b>					
<b>Firm's efficiency</b>	Cost efficiency	Ratio scale	Percentage computed using the Stochastic Frontier Technique (SFT)	Green and Dan Segal, (2004) (Robio-Misas, (2006) Isikand Hassan, (2007)	1Ai,ii,iii
	Profit efficiency	Ratio scale	Percentage computed using the Stochastic Frontier Technique (SFT) (Coeli, et al. 1998).		1Bi,ii,iii,v
	Operational efficiency	Ratio scale	Percentage computed using the Stochastic Frontier Technique (SFT) (Coeli, et al. 1998).		1Ci,ii,iii,iv
<b>DEPENDENT VARIABLE: FIRM VALUE</b>					
<b>Firm Value</b>	Market share price	Absolute scale	NSE data	Rayan (2008), Adeyemi et al, (2011) and Kadongo, et al, (2014)	4 A,B,C,D

Source: Author 2016

### 3.9 Data Analysis

Data collected was analysed through combination of both descriptive and inferential statistics. Panel data analyses were used to examine the extent to which the dependent variable is a function of one or more of independent variables. This was considered to be appropriate since it determines the influence of a single independent variable and several independent variables on the dependent variable (Robson, 2002). The models used in the study took the form below:

$$y_{it} = \alpha + \beta x_{it} + \lambda_t + v_{it} \quad (1)$$

#### 3.9.1 Data Analysis Techniques

Panel regression was adopted to ascertain the potency of the association amid dependent and predictor variables; and the controlling effect of other factors. Different statistics were derived from the analyses and interpreted in line with the studies' goals.

#### 3.9.2 Empirical Model for Testing Hypothesis One: Effect of Capital Structure on Firm Value

The first objective was to determine the relationship between capital structure and value of firms listed at the Nairobi Securities Exchange. Dependent - independent variables relationship model is:

$$FV_{it} = \beta_0 + \beta_{1it}DER_{it} + \beta_{2it}RER_{it} + \beta_{3it}ER_{it} + \beta_{4it}DR_{it} + \mu_{it} \dots \dots \dots (3.1)$$

Where:

$FV_{it}$  = Firm Value for  $i^{th}$  firm in  $t^{th}$  year.

$\beta_0$  = Intercept

$\beta_{1it}$  = Coefficient of Debt to Equity Ratio for  $i^{th}$  firm in  $t^{th}$  year.

$DER_{it}$  = Debt to Equity Ratio for  $i^{th}$  firm in  $t^{th}$  year.

$\beta_{2it}$ = Coefficient of Retained Earnings Ratio for  $i^{\text{th}}$  firm in  $t^{\text{th}}$  year.

$\text{RER}_{it}$ = Retained Earnings Ratio for  $i^{\text{th}}$  firm in  $t^{\text{th}}$  year.

$\beta_{3it}$ =Coefficient of Equity Ratio for  $i^{\text{th}}$  firm in  $t^{\text{th}}$  year.

$\text{ER}_{it}$ =Equity Ratio for  $i^{\text{th}}$  firm in  $t^{\text{th}}$  year.

$B_{4it}$ =Coefficient of Debt Ratio for  $i^{\text{th}}$  firm in  $t^{\text{th}}$  year.

$\text{DR}_{it}$ =Debt Ratio for  $i^{\text{th}}$  firm in  $t^{\text{th}}$  year

$\mu_{it}$  = Error Term

### **3.9.3 Empirical Models for Testing Hypothesis Two: Moderating Effect of Macroeconomic Environment**

Research objective number two was to establish the moderating effect of the macroeconomic environment and the firm value. This was carried out using the two steps methodology as in Stone-Romero & Liakhovitski (2002).The moderating effect was tested in two steps whose model specifications are outlined below:

#### **3.9.3.1 Step one of testing the Moderating Effect of Macroeconomic Environment**

In step one, capital structure and macroeconomic environment were used in a panel regression model as predictors of firm value. The empirical model that was tested in this step is:

$$\text{FV}_{it} = \beta_0 + \beta_{1it}\text{DER}_{it} + \beta_{2it}\text{RER}_{it} + \beta_{3it}\text{ER}_{it} + \beta_{4it}\text{DR}_{it} + \beta_{5it}\text{GGR}_t + \beta_{6it}\text{INFR}_t + \beta_{7it}\text{INTR}_t + \mu_{it} \dots \dots (3.2)$$

Where:

$\text{FV}_{it}$  = Firm Value for  $i^{\text{th}}$  firm in  $t^{\text{th}}$  year.

$\beta_0$ = Intercept

$\beta_{1it}$ =Coefficient of Debt to Equity Ratio for  $i^{\text{th}}$  firm in  $t^{\text{th}}$  year.

$\text{DER}_{it}$ =Debt to Equity Ratio for  $i^{\text{th}}$  firm in  $t^{\text{th}}$  year.

$\beta_{2it}$  = Coefficient of Retained Earnings Ratio for  $i^{\text{th}}$  firm in  $t^{\text{th}}$  year.

$\text{RER}_{it}$  = Retained Earnings Ratio for  $i^{\text{th}}$  firm in  $t^{\text{th}}$  year.

$\beta_{3it}$  = Coefficient of Equity Ratio for  $i^{\text{th}}$  firm in  $t^{\text{th}}$  year.

$\text{ER}_{it}$  = Equity Ratio for  $i^{\text{th}}$  firm in  $t^{\text{th}}$  year.

$\beta_{4it}$  = Coefficient of Debt Ratio for  $i^{\text{th}}$  firm in  $t^{\text{th}}$  year

$\text{DR}_{it}$  = Debt Ratio for  $i^{\text{th}}$  firm in  $t^{\text{th}}$  year.

$\beta_{5it}$  = Coefficient of GDP rate for  $i^{\text{th}}$  firm in  $t^{\text{th}}$  year.

$\text{GGR}_t$  = GDP growth Rate for  $t^{\text{th}}$  year.

$\beta_{6it}$  = Coefficient of inflation rate for  $i^{\text{th}}$  firm in  $t^{\text{th}}$  year

$\text{INFR}_t$  = Inflation Rate for  $t^{\text{th}}$  year.

$\beta_{7it}$  = Coefficient of Interest Rate for  $t^{\text{th}}$  year.

$\text{INTR}_t$  = Interest Rate for  $t^{\text{th}}$  year.

$\mu_{it}$  = Error Term

### 3.9.3.2 Step Two of Testing the Moderating Effect of Macroeconomic Environment

In the second step, the regression in step one above is repeated but with additional predictor variables derived from the interaction of the independent variable and the moderating variable. Such variables are called interaction terms. This study had nine interaction terms that are outlined below. Each moderating variable was multiplied by the corresponding independent variable to create the pertinent interaction term as per table 3.2 below.

**Table 3.2: Interaction Terms of the Independent and Moderating Variables**

Independent Variable	Moderating Variable			
		GDP Growth Rate	Interest Rate	Inflation Rate
Debt to Equity Ratio		IT1	IT4	IT7
Retention Ratio		IT2	IT5	IT8
Earnings Ratio		IT3	IT6	IT9

Source: Author 2016

In step two, the following model was fitted:

$$FV_{it} = \beta_0 + \beta_{1it}DER_{it} + \beta_{2it}RER_{it} + \beta_{3it}ER_{it} + \beta_{4it}GGR_t + \beta_{5it}INFR_t + \beta_{6it}INTR_t + \lambda_{1it}IT1_{it} + \lambda_{2it}IT2_{it} + \dots + \lambda_{12it}IT12_{it} + \mu_{it} \text{-----} \quad (3.3)$$

Where:

$FV_{it}$  = Firm Value for  $i^{th}$  firm in  $t^{th}$  year.

$\beta_0$  = Intercept

$\beta_{1it}$  = Coefficient of Debt to Equity Ratio for  $i^{th}$  firm in  $t^{th}$  year.

$DER_{it}$  = Debt to Equity Ratio for  $i^{th}$  firm in  $t^{th}$  year.

$\beta_{2it}$  = Coefficient of Retained Earnings Ratio for  $i^{th}$  firm in  $t^{th}$  year.

$RER_{it}$  = Retained Earnings Ratio for  $i^{th}$  firm in  $t^{th}$  year.

$\beta_{3it}$  = Coefficient of Earnings Ratio for  $i^{th}$  firm in  $t^{th}$  year.

$ER_{it}$  = Equity Ratio for  $i^{th}$  firm in  $t^{th}$  year.

$B_{4it}$  = Coefficient for GDP growth rate  $i^{th}$  firm in  $t^{th}$  year.

$GGR_t$  = GDP growth Rate for  $t^{th}$  year.

$B_{5it}$  = Coefficient for Inflation rate  $i^{th}$  firm in  $t^{th}$  year.

$INFR_t$  = Inflation Rate for  $t^{th}$  year.

$B_{6it}$  = Coefficient for Interest rate  $i^{th}$  firm in  $t^{th}$  year.

$INTR_t$  = Interest Rate for  $t^{th}$  year.

$\lambda_{1it} \dots \lambda_{9it}$  = Respective coefficients of the 9<sup>th</sup> interaction terms for  $i^{th}$  firm in  $t^{th}$  year.

$IT1_{it} \dots IT9_{it}$  = The 9<sup>th</sup> interaction terms for  $i^{th}$  firm in  $t^{th}$  year.

$\mu_{it}$  = Error Term.

**3.9.4 Empirical Models for testing Hypothesis Three: Intervening Effect of Firm’s efficiency**

The third research objective was to determine the intervening influence of firm efficiency on the relationship between firm capital structure and the value of the firm. There were four steps in testing the intervening effect of firm efficiency on the relationship between capital structure and firm value. The pertinent models for the three steps are outlined below:

**3.9.4.1 Step One of Testing the Intervening Effect of Firm’s efficiency**

In step one, the model to be fitted was similar to model 3.1. As such, results of fitting model 3.1 were considered. After fitting model 3.1, all regressors were significant and hence they were considered further.

**3.9.4.2 Step Two of Testing the Intervening Effect of Firm’s efficiency**

Step two of testing the intervening effect of firm characteristic entailed estimating the relationship between the capital structure and firm efficiency. Regression analysis was done with the independent variables as the regressors of intervening variables. To prevent the problem of multicollinearity, the variable “debt ratio” was excluded from further analysis since it had a high degree of collinearity with the highest number of variables (three)( $r=0.878$ ). Each intervening variable was estimated using the corresponding independent variable, and the three panel regression models below were fitted:

$$CEFF_{it} = \beta_0 + \beta_{1it}DER_{it} + \mu_{it} \dots \dots \dots (3.4)$$

$$OEFF_{it} = \beta_0 + \beta_{1it}RER_{it} + \mu_{it} \dots \dots \dots (3.5)$$

$$PEFF_{it} = \beta_0 + \beta_{1it}ER_{it} + \mu_{it} \dots \dots \dots (3.6)$$

Where:

CEFF<sub>it</sub>= Cost Efficiency for i<sup>th</sup> firm in t<sup>th</sup> year.

OEFF<sub>it</sub>= Operational Efficiency for i<sup>th</sup> firm in t<sup>th</sup> year.

PEFF<sub>it</sub>= Profit Efficiency for i<sup>th</sup> firm in t<sup>th</sup> year.

DER<sub>it</sub>=Debt to Equity Ratio for i<sup>th</sup> firm in t<sup>th</sup> year.

RER<sub>it</sub>= Retained Earnings Ratio for i<sup>th</sup> firm in t<sup>th</sup> year.

ER<sub>it</sub>= Equity Ratio for i<sup>th</sup> firm in t<sup>th</sup> year.

$\beta_0$  = Intercept

$\beta_{1it}$ =Coefficient of the respective indicator of capital structure for i<sup>th</sup> firm in t<sup>th</sup> year.

$\mu_{it}$  = Error Term

Only the variables whose coefficients are significant would be considered further. The coefficients of all three independent variables of these equations were not significant. As such, the researcher concluded that there is no intervening effect of firm efficiency at this step. It was not possible to progress to step three and four.

### **3.9.5 Empirical Model for Testing Hypothesis Four: Joint Effect of Capital Structure, Macroeconomic Environment, and Firm's efficiency on Firm Value.**

The fourth research objective was to establish the joint effect of firm capital structure, macroeconomic environment and firm's efficiency on the value of firms listed at the Nairobi Securities Exchange.

The panel model that was used to test this hypothesis was:

$$FV_{it} = \beta_0 + \beta_{1it}DER_{it} + \beta_{2it}RER_{it} + \beta_{3it}ER_{it} + \beta_{4it}DR_{it} + \beta_{4it}GGR_t + \beta_{5it}INFR_t + \beta_{6it}INTR_t + \beta_{7it}CEFF_{it} + \beta_{8it}OEFF_{it} + \beta_{9it}PEFF_{it} + \mu_{it} \text{-----} (3.3)$$



Where:

$FV_{it}$  = Firm Value for  $i^{\text{th}}$  firm in  $t^{\text{th}}$  year.

$\beta_0$  = Intercept

$\beta_{1it}$  = Coefficient of Debt to Equity Ratio for  $i^{\text{th}}$  firm in  $t^{\text{th}}$  year.

$DER_{it}$  = Debt to Equity Ratio for  $i^{\text{th}}$  firm in  $t^{\text{th}}$  year.

$\beta_{2it}$  = Coefficient of Retained Earnings Ratio for  $i^{\text{th}}$  firm in  $t^{\text{th}}$  year.

$RER_{it}$  = Retained Earnings Ratio for  $i^{\text{th}}$  firm in  $t^{\text{th}}$  year.

$\beta_{3it}$  = Coefficient of Equity Ratio for  $i^{\text{th}}$  firm in  $t^{\text{th}}$  year.

$ER_{it}$  = Equity Ratio for  $i^{\text{th}}$  firm in  $t^{\text{th}}$  year.

$B_{4t}$  = Coefficient of GDP growth Rate for  $t^{\text{th}}$  year.

$GGR_t$  = GDP growth Rate for  $t^{\text{th}}$  year.

$B_{5t}$  = Coefficient of Inflation Rate for  $t^{\text{th}}$  year.

$INFR_t$  = Inflation Rate for  $t^{\text{th}}$  year.

$B_{6it}$  = Coefficient of Interest Rate for  $t^{\text{th}}$  year.

$INTR_t$  = Interest Rate for  $t^{\text{th}}$  year.

$B_{7it}$  = Coefficient of Cost Efficiency for  $i^{\text{th}}$  firm in  $t^{\text{th}}$  year.

$CEFF_{it}$  = Cost Efficiency for  $i^{\text{th}}$  firm in  $t^{\text{th}}$  year.

$B_{8it}$  = Coefficient of Operational Efficiency for  $i^{\text{th}}$  firm in  $t^{\text{th}}$  year.

$OEFF_{it}$  = Operational Efficiency for  $i^{\text{th}}$  firm in  $t^{\text{th}}$  year.

$B_{9it}$  = Coefficient of Profit Efficiency for  $i^{\text{th}}$  firm in  $t^{\text{th}}$  year.

$PEFF_{it}$  = Profit Efficiency for  $i^{\text{th}}$  firm in  $t^{\text{th}}$  year.

$\mu_{it}$  = Error Term

**Table 3.3: Summary of Statistical Tests of Hypothesis**

Objective	Hypothesis	Analytical Method	Interpretation
<p><b>(i)Objective One:</b> To Establish the effect of capital structure on the value of the firms listed at the Nairobi Securities Exchange</p>	<p><b>H<sub>1</sub>:</b>Capital structure does not significantly influence the value of firms listed at the Nairobi Securities Exchange</p>	<p>Panel regression analysis to test the effect of capital structure on firm value  <math display="block">FV_{it} = \beta_0 + \beta_{1it}DER_{it} + \beta_{2it}RER_{it} + \beta_{3it}ER_{it} + \beta_{4it}DR_{it} + \mu_{it}</math></p>	<p>If calculated p – value is less than alpha (0.05), then overall model is significant. Therefore reject the null hypothesis and fail to reject the alternative hypothesis</p>
<p><b>(ii)Objective Two:</b> To determine the influence of macro-economic environment on the relationship between capital structures and the value of firms listed at the Nairobi Securities Exchange.</p>	<p><b>H<sub>2</sub>:</b> Macroeconomic environment does not significantly affect the relationship between capital structure and value of firms listed at the Nairobi Securities Exchange.</p>	<p>Stepwise regression analysis to test the moderating effect of macroeconomic environment on the relationship between capital structure and firm value  <i>Step One :</i>  <math display="block">FV_{it} = \beta_0 + \beta_{1it}DER_{it} + \beta_{2it}RER_{it} + \beta_{3it}ER_{it} + \beta_{4it}DR_{it} + \beta_{5it}GGR_t + \beta_{6it}INFR_t + \beta_{7it}INTR_t + \mu_{it}</math>  <i>Step Two :</i>  <math display="block">FV_{it} = \beta_0 + \beta_{1it}DER_{it} + \beta_{2it}RER_{it} + \beta_{3it}ER_{it} + \beta_{4it}ER_{it} + \beta_{5it}GGR_t + \beta_{6it}INFR_t + \beta_{7it}INTR_t + \lambda_{1it}IT1_{it} + \lambda_{2it}IT2_{it} + \dots + \lambda_{12it}IT12_{it} + \mu_{it}</math></p>	<p>If calculated p – value is less than alpha (0.05), then overall model is significant. Therefore reject the null hypothesis and fail to reject the alternative hypothesis</p>
<p><b>(iii)Objective Three:</b> To ascertain the intervening effect of firm’s efficiency on the relationship between capital structure and the value of firms listed at the Nairobi Securities Exchange.</p>	<p><b>H<sub>3</sub></b> Firm’s efficiency do not have significant intervening effect on the relationship between capital structure and value of firms listed at the Nairobi Securities Exchange.</p>	<p>Stepwise regression analysis to test the intervening effect of firm’s efficiency on the relationship between capital structure and firm value  <i>Step One :</i>  <math display="block">FV_{it} = \beta_0 + \beta_{1it}DER_{it} + \beta_{2it}RER_{it} + \beta_{3it}ER_{it} + \beta_{4it}ER_{it} + \mu_{it}</math>  <i>Step Two :</i>  <math display="block">CEFF_{it} = \beta_0 + \beta_{1it}DER_{it} + \mu_{it}</math>  <math display="block">OEFF_{it} = \beta_0 + \beta_{1it}RER_{it} + \mu_{it}</math>  <math display="block">PEFF_{it} = \beta_0 + \beta_{1it}ER_{it} + \mu_{it}</math></p>	<p>Systematically determine the intervening variable to be included in the model to detect how it contributes to explaining the variance</p>

<p><b>(iv)Objective Four:</b> To determine if the joint effect of capital structure, economic environment and firm's efficiency is more than the individual effect of capital structure on the value of firm listed at the Nairobi Securities Exchange</p>	<p><b>H4:</b> The joint influence of firm capital structure, economic environment and firm's efficiency do not significantly influence value of firms listed at Nairobi Securities Exchange</p>	<p>Multivariate regression analysis testing the joint influence of capital structure, macroeconomic environment, firm's efficiency on the value of the firm.</p> $FV_{it} = \beta_0 + \beta_{1it}DER_{it} + \beta_{2it}RER_{it} + \beta_{3it}ER_{it} + \beta_{4it}ER_{it} + \beta_{5it}GGR_t + \beta_{6it}INFR_t + \beta_{7it}INTR_t + \beta_{8it}CEFF_{it} + \beta_{9it}OEFF_{it} + \beta_{10it}PEFF_{it} + \mu_{it}$	<p>If calculated p – value is less than alpha (0.05), then overall model is significant. Therefore reject the null hypothesis and fail to reject the alternative hypothesis</p>
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Source: Author, 2016

## **CHAPTER FOUR**

### **DESCRIPTIVE DATA ANALYSIS AND PRESENTATION**

#### **4.1 Introduction**

This section presents the results of the descriptive data analysis of the variables of the study. It entails a discussion of the summary statistics of the study's dependent variable (market share price), independent variables (debt equity ratio, debt ratio, equity ratio, and retained earnings), intervening variables (cost efficiency, operational efficiency, and profit efficiency), and moderating variables (inflation rate, GDP growth rate and interest rate). Unit root tests and correlation analysis are also presented for all variables.

#### **4.2 Study Sample**

Out of 42 non- financial institutions listed at the Nairobi Security Exchange that the study initially targeted complete data was available for 30 companies. As such, the sample consisted of 30 non-financial institutions that traded consistently over the 2009 to 2014 period and whose data was available. This represents a success rate of 71% that was perceived as satisfactory. Munjuri (2013) conducted a study on insurance firms and commercial banks and attained a success rate of 61% (54 out of 88). Machuki (2011) achieved 43.3 % (23 out of 53) in a research of organizations floating their shares on the NSE.

#### **4.3 Research Design**

The main objective of this study was to establish the nature of the association and the influence of capital structure status on organizational wealth. The study further analysed the impact of macroeconomic aspects and firm efficiency on the relationship between the two main variables. This study employed a descriptive longitudinal research design. The study used panel data analysis based on the generalized least squares model.

#### 4.4 Descriptive Statistics

In order to envisage a general picture of the outlook of the data, the researcher computed the mean, standard deviation, minimum, maximum, kurtosis, and skewness of the variables. The mean shows the average of all observations for a variable in the dataset. The standard deviation portrays the extent of dispersion: it shows the extent to which observations are dispersed around the mean. The minimum and maximum values show the respective lower and upper bounds of a variable's values. Kurtosis shows the peakedness of data relating to variables under research. This statistic is measured using the fourth moment of the data about the mean. Skewness shows the extent to which observations are symmetrical about the mean. For a unimodal series of data, negative skew shows the left side tail of the probability density function is longer or fatter than the right side.

**Table 4.1: Summary Statistics for Non-Financial Firms Data for the Period 2009 to 2014**

Variable	Indicators (s)	mean	Sd	min	max	kurtosis	skewness
Firm Value	Market Share Price	71.44256	87.1177	1.75	500	7.635904	2.000684
Capital Structure	Debt to equity Ratio	0.478456	0.700063	0	0.6368421	30.54732	4.099016
	Retained Earnings Ratio	0.285541	0.150471	-0.39362	0.628952	5.619681	-0.9138
	Equity Ratio	0.526853	0.142063	0.135714	1.058511	4.246464	0.490357
	Debt Ratio	0.187606	0.18857	0	0.864286	3.317357	0.945174
Macroeconomic Environment	GDP Growth Rate	0.04126667	1.557465	0.033	0.084	2.629442	0.459609
	Inflation Rate	0.1159167	0.031929	0.041	0.14	2.354399	0.55791
	Interest rate	0.153216	0.027072	0.035992	0.127558	2.795242	-0.22749
Firm;s efficiency	Cost efficiency	0.3536667	12.97049	0.10	0.72	3.729655	0.461243
	Operational efficiency	0.6578889	13.80794	0.14	0.89	4.11583	-0.92081
	Profit efficiency	0.5115556	16.75783	0.10	0.89	2.802332	-0.32975

**Source: Author 2016**

The summary statistics for the 30 sampled firms over the 2009 to 2014 period are shown in table 4.1 above. The statistical measures that were computed for the study's variables are mean, standard deviation, minimum, maximum, kurtosis, and skewness. Taking a look

at the statistics for the dependent variable, market share prices of the sampled firms, analysis indicate that the share prices were quite volatile across the panels, with a low of Kshs 1.75 and a high of Kshs 500. The mean of market share price was Kshs 71.44256. Additionally, this variable had a kurtosis of 7.635904 and a skewness of 2.000684 this implies that the market share prices had fat tails, a leptokurtic distribution, and right skewness.

The debt to equity ratio variable had a mean of 0.478456, which essentially means that on average, the firms had 48 cents in debt for every shilling of equity in their balance sheet. With a standard deviation of 0.7, it is evident that debt to equity ratios of the sampled firms were quite dispersed. This is affirmed further by the fact that the minimum value for debt to equity was 0 (i.e. 100% equity financing) while the maximum value was 6.368421 (i.e. these firm were extremely leveraged during the pertinent period. It held Kshs 6.36 in debt for each 1Kshs it had in equity). The debt to equity exhibited a very high level of kurtosis (30.54732) and positive skewness (4.099016).

Observations for the retained earnings ratio showed that on average, 28.55% of the assets of the sampled firms were financed using retained earnings. The least value for this statistic was -0.39362 (implying a loss making situation) while the highest value was 0.628952. Just like other variables, the retained earnings ratio had a leptokurtic distribution (kurtosis=5.619681) but in contrast with other variables, retained earnings ratio had a slightly negative skewness (-0.9138)

The equity ratio of the sampled firms was at a mean value of 0.526853. This means that on average, the sampled firms had a tendency of financing just over half of their assets using equity. This variable was quite stable (s.d. = 0.142063), with low dispersion around the mean. The least value for this variable was 0.135714 while the highest was 1.058511, implying the rare situation of negative debt (-0.058511) that arises when a firm has not only cleared its debts, but it has overpaid them. In principle, a negative liability is considered an asset to the organization that ought to be categorized as a prepaid expense. The moderating variable macroeconomic environment is represented by the economic growth rate, interest and changes in price levels. The mean for economic growth rate, inflation rate, and interest rate are 4.12%, 11.59%, and 15.32% respectively. This shows that the macroeconomic environment was favourable for business performance. On the intervening variables, the mean for cost efficiency, operational efficiency, and profit efficiency were 35.4%, 65.8% and 51.2%, respectively. The maximum cost efficiency, operational efficiency, and profit efficiency were 72%, 89%, and 89% while the minimum cost efficiency, operational efficiency, and profit efficiency were 10%, 14%, and 10%, respectively.

#### **4.5 Correlation Analysis**

This section presents the results of the correlation analysis of study variables using Pearson's product-moment correlation. A value of 1 indicates perfect positive correlation implying that an unit change in a variable is accompanied by a proportional change in the other variable while a value of -1 indicate perfect negative correlation which imply that an increase in one variable is followed by a proportional decrease in the other variable (Cooper & Schindler, 2003).

Pearson correlation coefficient,  $r$ , closer to either +1 or -1 indicate how strong the association between the variables is based on the nature as either being positive or negative, respectively (Cooper & Schindler, 2003). According to Sekaran (1992), the Pearson's correlation is used if the variables of the study are measured using either interval or ratio scales. Correlation results are reported at a significance level of 0.05 and 0.01 in line with other studies such as Kidombo (2007): Muia (2012). Mirie (2014) and Iraya (2014). Multicollinearity is present in data when two or more independent variables are highly correlated in such a manner that one variable can be estimated from another one with a high degree of accuracy. High degrees of multicollinearity inflate the  $R^2$  such that the overall regression looks good in as much as individual regressors could be insignificant. Multicollinearity also makes a research to lose robustness. In highly collinear data, small changes in specification can cause big changes in regression coefficients and/or their significance. Multicollinearity is usually evaluated using the Pearson correlation coefficients matrix. According to Brown (2011), a Pearson correlation coefficient that is greater than 0.8 indicates multicollinearity between the two pertinent variables.

**Table 4.2: Correlation between Firm Value and Capital Structure**

	Market Share Price	Debt to equity Ratio	Retained Earnings Ratio	Equity Ratio	Debt Ratio
Market Share Price	1	-.259**	.387**	0.107	-.392**
**. Correlation is significant at the 0.01 level (2-tailed).					
*. Correlation is significant at the 0.05 level (2-tailed).					

**Source: Author 2016**

Table 4.2 shows the correlation matrix between firm value (as measured by market share price and capital structure (as measured by debt to equity ratio, retained earnings ratio, equity ratio, and debt ratio). First it is important to note that all Pearson correlation



coefficients (except the correlation between Market Share Price and Equity Ratio) were statistically substantial at the 1% level. There was a relatively strong negative correlation amid D/E ratio and firm share prices. The relationship between retained earnings ratio was quite strong ( $r=0.387$ ) while the effect of equity ratio on market share price was relatively weak and insignificant at both 5% and 1% levels of significance.

The strong, positive and significant correlation between retained earnings and market share price can be attributed to many factors. Most important of all, firms with high retention rates are viewed by the market as growth firms with huge prospects for the future. Finally, Debt Ratio and market share price had a relatively strongly, negative correlation ( $r = -.392$ ). The negative effect of the debt to equity ratio and debt ratio on the market share price shows a strong preference on unlevered stocks by investors. Due to mandatory interest and principal repayments, highly indebted firms tend to have less amounts of money that are available for distribution as dividends. Additionally, debt could send a signal that the financial health of a firm is in turmoil, thereby making it less attractive to investors.

**Table 4.3: Correlation between Firm Value and Macroeconomic Environment**

	Market Share Price	GDP Growth Rate	Inflation Rate	Interest rate
Market Share Price	1	-.212**	0.09	.164*
**. Correlation is significant at the 0.01 level (2-tailed).				
*. Correlation is significant at the 0.05 level (2-tailed).				

**Source: Author 2016**

As evident in table 4.3 above, the study found a negative and significant relationship between GDP growth and market share price. This could be a sign of robustness of the Nairobi Securities Exchange in the sense that shares listed on it exhibited growth in the face of declining GDP growth rates. The rate of inflation over the study period was found

to have a weakly positive but insignificant correlation ( $r=0.09$ ) with the market share price. Additionally, the prevailing nominal interest rates had a relatively strong correlation coefficient with market share price ( $r=0.164$ ) that was significant at 5%.

**Table 4.4: Correlation between Firm Value and Firm's efficiency**

	Market Share Price	Cost efficiency	Operational efficiency	Profit efficiency
Market Share Price	1	.321**	-.216**	.233**
**. Correlation is significant at the 0.01 level (2-tailed).				
*. Correlation is significant at the 0.05 level (2-tailed).				

**Source: Author 2016**

According to table 4.4 above, the study yielded evidence of a relatively strong, positive and significant correlation between cost efficiency and market share price ( $r=0.321$ ). Operational efficiency had a negative, significant relationship with market share price ( $r=-0.216$ ) while profit efficiency had a positive and significant correlation with market share price ( $r=0.233$ ).

**Table 4.5: Correlation between Capital Structure and Macroeconomic Environment**

	Debt to equity Ratio	Retained Earnings Ratio	Equity Ratio	Debt Ratio	GDP Growth Rate	Inflation Rate	Interest rate
Debt to equity Ratio	1						
Retained Earnings Ratio	-.487**	1					
Equity Ratio	-.650**	-.170*	1				
Debt Ratio	.878**	-.671**	-.617**	1			
GDP Growth Rate	0.102	-0.111	-0.09	.154*	1		
Inflation Rate	-0.063	-0.012	0.087	-0.058	-.688**	1	
Interest rate	-0.106	0.036	.235**	-.203**	-0.082	-.151*	1
**. Correlation is significant at the 0.01 level (2-tailed).							
*. Correlation is significant at the 0.05 level (2-tailed).							

**Source: Author 2016**

Table 4.5 above shows the correlation coefficients between indicators of capital structure and those of macroeconomic environment. Retained earnings ratio had a strong negative correlation with the debt to equity ratio ( $r=-0.487$ ). This could be attributed to the fact that an increase in debt holding other factors constant decreases the relative proportion of retained earnings in the balance sheet, and vice versa. The equity ratio also had a strong, negative correlation with the debt to equity ratio ( $r=-0.650$ ) that was significant at 1% level and a relatively weak negative correlation with retained earnings ratio ( $r=-0.170$ ) that was significant at the 5% level. Debt ratio had a very strong positive correlation with debt to equity ratio ( $r=0.878$ ), strong negative correlation with retained earnings to total assets ratio ( $r=-0.671$ ) and strong negative correlation with Equity Ratio ( $r=-0.617$ ). These three correlations were significant at the 1% level. The GDP Growth Rate showed weak positive correlation with debt to equity ratio ( $r=0.102$ ), weak negative correlation with the retained earnings ratio ( $r=-0.111$ ), weak negative correlation with equity ratio ( $r=0.09$ ) and a positive correlation with debt ratio ( $r=0.154$ ). Inflation rate showed negative correlations with debt to equity ratio ( $r=-0.063$ ), retained earnings ratio ( $r=-0.012$ ), debt ratio ( $r=-0.058$ ), GDP growth rate ( $R=-0.688$ ), and a positive correlation with equity ratio ( $r=0.087$ ). Finally, the Interest rate had positive correlations with retained earnings ratio ( $r=0.036$ ) and equity ratio ( $r=0.235$ ) and negative correlations with debt to equity ratio ( $r=-0.106$ ), debt ratio ( $r=-0.203$ ), GDP growth rate ( $r=-0.082$ ) and inflation rate ( $r=-0.151$ ).

To prevent the problem of multicollinearity, the variable “debt ratio” was excluded from further analysis since it had a high degree of collinearity with the highest number of variables (three) that it would be fitted jointly with in a model as a regressor. These are debt to equity ratio ( $r=0.878$ ), retained earnings ratio ( $r=-0.671$ ) and equity ratio ( $r=-0.617$ ).

**Table 4.6: Correlation between Capital Structure and Firm's efficiency**

	Debt to equity Ratio	Retained Earnings Ratio	Equity Ratio	Debt Ratio	Cost Efficiency	Operational Efficiency	Profit Efficiency
Debt to equity Ratio	1						
Retained Earnings Ratio	-.487**	1					
Equity Ratio	-.650**	-0.170*	1				
Debt Ratio	0.878**	-0.671**	-0.617**	1			
Cost Efficiency	0.026	0.061	-0.016	-0.035	1		
Operational Efficiency	0.063	-0.084	-0.023	0.086	0.098	1	
Profit Efficiency	-0.006	0.181*	-0.086	-0.081	-0.188*	-0.269**	1
** . Correlation is significant at the 0.01 level (2-tailed).							
* . Correlation is significant at the 0.05 level (2-tailed).							

**Source: Author 2016**

As evident in table 4.6 above, Cost efficiency had weak positive correlation with debt to equity ratio ( $r=0.026$ ) and retained earnings ratio ( $r=0.061$ ) and weak negative correlation with equity ratio ( $r=-0.016$ ) and debt ratio ( $r=-0.035$ ). Operational efficiency was found to have negative correlation with retained earnings ratio ( $r=0.084$ ) and equity ratio ( $r=-0.023$ ) and positive correlation with debt to equity ratio ( $r=0.063$ ), debt ratio ( $r=0.086$ ) and cost efficiency ( $r=0.098$ ). Finally, profit efficiency had a positive correlation with retained earnings ratio ( $r=0.181$ ) and negative correlation with debt to equity ratio ( $r=-0.006$ ), equity ratio ( $r=-0.086$ ), debt ratio ( $r=-0.081$ ), cost efficiency ( $r=-0.188$ ), and operational efficiency ( $r=-0.269$ ).

**Table 4.7: Correlation between Macroeconomic Environment and Firm's efficiency**

	GDP Growth Rate	Inflation Rate	Interest rate	Cost Efficiency	Operational Efficiency	Profit Efficiency
GDP Growth Rate	1					
Inflation Rate	-.688**	1				
Interest rate	-0.082	-.151*	1			
Cost Efficiency	-.149*	0.094	.260**	1		
Operational Efficiency	.195**	-0.027	-0.114	0.098	1	
Profit Efficiency	0.069	-.171*	0.13	-.188*	-.269**	1
** . Correlation is significant at the 0.01 level (2-tailed).						
* . Correlation is significant at the 0.05 level (2-tailed).						

**Source: Author 2016**

Table 4.7 shows the results of correlation analysis between indicators of macroeconomic environment and those of firm efficiency. There was negative correlation between cost efficiency and GDP growth rate (-0.149) and positive correlation between cost efficiency and inflation rate ( $r=0.094$ ) and interest rate ( $r=0.260$ ). Operational efficiency had positive correlation with GDP growth rate ( $r=0.195$ ) and negative correlation with inflation rate ( $r=-0.027$ ) and interest rate ( $r=-0.114$ ). Profit efficiency had negative correlation with inflation ( $r=-0.171$ ) and positive correlation with GDP growth rate ( $r=0.069$ ) and interest rate ( $r=0.13$ ).

#### **4.6 Chapter Summary**

This chapter has presented results of descriptive data analysis on all variables of the study and correlation analysis using Pearson Product-Moment correlation. The response rate was 71% calculated from 42 non-financial firms listed at the Nairobi Securities Exchange.

Descriptive statistics on capital structure (the independent variable) showed that the debt to equity ratio variable had a mean of 0.478456, which essentially means that on average, the firms had 48 cents in debt for every shilling of equity in their balance sheet. With a standard deviation of 0.7, it is evident that debt to equity ratios of the sampled firms were quite dispersed. This is affirmed further by the fact that the minimum value for debt to equity was 0 (i.e. 100% equity financing) while the maximum value was 6.368421 (i.e. these firms were extremely leveraged during the pertinent period. They held Kshs 6.36 in debt for each 1Kshs they had in equity). The debt to equity exhibited a very high level of kurtosis (30.54732) and positive skewness (4.099016).

Retained earnings ratio showed that on average, 28.55% of the assets of the sampled firms were financed using retained earnings. The least value for this statistic was -0.39362 (implying a loss making situation) while the highest value was 0.628952. Just like other variables, the retained earnings ratio had a leptokurtic distribution (kurtosis=5.619681) but in contrast with other variables, retained earnings ratio had a slightly negative skewness (-0.9138) while equity ratio of the sampled firms was at a mean value of 0.526853. This means that on average, the sampled firms had a tendency of financing just over half of their assets using equity. This variable was quite stable (s.d. = 0.142063), with low dispersion around the mean. The least value for this variable was 0.135714 while the highest was 1.058511, implying the rare situation of negative debt (-0.058511) that arises when a firm has not only cleared its debts, but it has overpaid them. Technically, a negative liability is a company asset, and so should be classified as a prepaid expense

The moderating variable macroeconomic environment is represented by the economic growth rate, inflation rate, and interest rate. The mean for economic growth rate, inflation

rate, and interest rate are 4.12%, 11.59%, and 15.32% respectively. The results indicate that the macroeconomic environment was favourable for business performance. While the intervening variables comprising of cost, operational and profit efficiencies showed a mean 35.4%, 65.8% and 51.2%, respectively. The maximum cost efficiency, operational efficiency, and profit efficiency were 72%, 89%, and 89% while the minimum cost efficiency, operational efficiency, and profit efficiency were 10%, 14%, and 10%, respectively. The mean for operational, cost and profit efficiency were 65%, 35% and 51% respectively. The results of the analysis demonstrate that the firms are using more inputs for a unit of output compared to the best firm. Therefore, firms must sell their products at higher prices to break even. This means that the outputs of the firms are not competitive in the market leading to decline in revenues and profits. Consequently the dividends expected to be paid to the owners will drop and this information will negatively affect the market share price of the firm.

The market share prices (dependent variable) of the sampled firms showed that the share prices were quite volatile across the panels, with a low of Kshs 1.75 and a high of Kshs 500. The mean of market share price was Kshs 71.44256. Additionally, the market share price had a kurtosis of 7.635904 and a skewness of 2.000684 implying that the market share prices had fat tails, a leptokurtic distribution, and right skewness.

The results of correlation analysis shows that there was a relatively strong negative correlation between debt to equity ratio and market share price. The correlation between retained earnings ratio and market share price was strong ( $r=0.387$ ) while the effect of equity ratio on market share price was relatively weak and insignificant at both 5% and 1% levels of significance. The strong, positive and significant correlation between retained

earnings and market share price can be attributed to many factors. Most important of all, firms with high retention rates are viewed by the market as growth firms with huge prospects for the future. Finally, Debt Ratio and market share price had a relatively strong negative correlation ( $r = -.392$ ). The negative effect of the debt to equity ratio and debt ratio on the market share price shows a strong preference on unlevered stocks by investors. Due to mandatory interest and principal repayments, highly indebted firms tend to have less amounts of money that are available for distribution as dividends. Additionally, debt could send a signal that the financial health of a firm is in turmoil, thereby making it less attractive to investors.

To prevent the problem of multicollinearity, the variable “debt ratio” was excluded from further analysis since it had a high degree of collinearity with the highest number of variables (three) that it would not be fitted jointly in a model as a regressor. These are debt to equity ratio ( $r=0.878$ ), retained earnings ratio ( $r=-0.671$ ) and equity ratio ( $r=-0.617$ ).



## **CHAPTER FIVE**

### **HYPOTHESES TESTING AND DISCUSSION OF FINDINGS**

#### **5.1 Introduction**

In this chapter, the hypotheses of the study were tested and results of hypothesis testing were discussed. For each of the four hypotheses, analysis started with the conducting of diagnostic testing to appraise the conformance of the data with assumptions of Ordinary Least Squares (OLS) panel regression analysis. This was to enable the researcher to use robust models that are an exact fit for the data's attributes thereby preventing the probability of making either a type 1 error (rejecting a correct null hypothesis) or a type 2 error (failing to reject an incorrect null hypothesis).

##### **5.1.1 Diagnostic Testing**

Diagnostic tests are pre estimation procedures that evaluate whether the assumptions of Ordinary Least Squares (OLS) panel regression analysis are upheld. In particular, a strong linear relationship should not exist between any variables that are fitted jointly as regressors in a model (no multicollinearity), there should be panel level stationarity, error terms should be linearly independent (no autocorrelation), the variance of the error terms should be constant (no heteroscedasticity), and the error terms should be normally distributed (with a mean of zero and a constant variance). These assumptions and the particular tests that were used to test for each of them are discussed in detail below.

###### **5.1.1.1 Testing for Multicollinearity**

The researcher used Variance inflation factors of the independent variables to test multicollinearity. Variance inflation factors (VIF) measure how much the variance of the estimated regression coefficients are inflated as compared to when the predictor variables

are not linearly related. As a rule of thumb, a variable whose VIF values are greater than 10 may merit further investigation. Tolerance, defined as  $1/\text{VIF}$ , is used by many researchers to check on the degree of collinearity. A tolerance value lower than 0.1 is comparable to a VIF of 10. It means that the variable could be considered as a linear combination of other independent variables.

#### **5.1.1.2 Panel Level Stationarity**

In order to analyze data using panel regression models, it should be stationary. Non stationary data is likely to result in spurious regressions since mean and standard deviation estimates derived from such data will be non-constant. To test the data for stationarity, the Levin Lin Chu (LLC) Test unit root test was applied for all regression analysis of this study. The null hypothesis of this test is that panels contain unit roots, whereas the alternative hypothesis implies stationarity in the panel data. Pertaining rejection criteria, the null hypothesis of a unit root is rejected if the p value of the LLC test is less than 5%.

#### **5.1.1.3 Serial Correlation**

Serial correlation (also called autocorrelation) is a phenomenon which occurs when the error terms of regression variables for successive periods are correlated. When present in a dataset, it can distort the efficiency of regression estimators. Using the Wooldridge test for serial correlation; we tested this study's data for the presence of autocorrelation. The null hypothesis for this test is that there is no first order autocorrelation in the panels and is rejected if the p value of the test is less than 5%.

#### **5.1.1.4 Likelihood Ratio Test for Heteroscedasticity**

Heteroscedasticity is a serious problem since it tends to inflate the standard errors, thereby increasing the probability of committing a type two errors, i.e. failing to reject a false hypothesis about a coefficient. The Likelihood Ratio test was used to test the data for heteroscedasticity. The null hypothesis of the Likelihood Ratio test is that the data is homoscedastic cross entities, i.e. the error terms have a constant variance. If the null is rejected, the conclusion is that the data is heteroscedastic, i.e. the variance of error terms across entities is not constant. The rejection criteria is that the null of homoscedasticity is rejected if the p value of the Likelihood Ratio test is less than 5%.

#### **5.1.2 Model Fitting**

Classic panel data analysis suggests that the Hausman specification test should be used to help the researcher in making a decision on whether to fit the random effects model or the fixed effects model. These two models assume that the data meets all the assumptions of regression analysis, i.e. no collinearity of regressors, no autocorrelation, and that the error terms are normally distributed with a mean of 0 and a constant variance, i.e. no heteroscedasticity.

Each violation of CLRM assumptions has a remedy. In instances where there is multicollinearity, the variable with the highest Variance Inflation Factor (VIF) should be excluded from further analysis. In cases of autocorrelation, a Prais Winsten Panel Regression model should be fitted while in cases where there is heteroscedasticity, a normal panel model (but with corrected/robust standard errors) should be fitted.

## 5.2 Relationship between Capital Structure and the Value of the Firm

This part relates to the first objective of the study. The researcher investigated the relationship between capital structure (as measured by debt to equity ratio, retained earnings ratio, and equity ratio) and value of the firm, as measured using the market share price. Hypothesis one was, which was framed in the null below was tested.

*H<sub>01</sub>: Capital structure does not have a significant influence the value of the firm.*

### Diagnostic Testing

Panel data analysis started with diagnostic testing to evaluate whether the study conformed to the assumptions of panel regression analysis.

### Testing for Multicollinearity

The tests for multicollinearity, as shown in table 5.1 below, indicated a severe problem of multicollinearity within the independent variables. The mean VIF was 872.86. The least VIF was for Debt to equity Ratio (4.77) while all other independent variables had VIFs that were greater than 10, with debt ratio having the highest VIF (1578.68).

**Table 5.1: Test for Multicollinearity**

Variable	VIF	Tolerance
Debt to equity Ratio	4.77	0.2096
Retained Earnings Ratio	1010.29	0.001
Equity Ratio	897.7	0.0011
Debt Ratio	1578.68	0.0006
Mean VIF	872.86	

**Source: Author 2016**

The researcher handled the multicollinearity problem by dropping the variable “debt ratio” from the analysis. This solved the problem of multicollinearity since the remaining independent variables had VIFs that were less than the threshold value of 10. Additionally, the mean VIF dropped to 3.78. This is evident in table 5.2 below.

**Table 5.2: Test for Multicollinearity after Dropping the “Debt Ratio” Independent Variable**

<b>Variable</b>	<b>VIF</b>	<b>Tolerance</b>
Debt to equity Ratio	4.77	0.2096
Retained Earnings Ratio	2.84	0.3526
Equity Ratio	3.75	0.2669
Mean VIF	3.78	

**Source: Author 2016**

#### **Testing for Panel Level Stationarity**

Table 5.3 below shows the results of unit root tests. The-Levin Lin-Chu tests for panel level stationarity indicated that none of the panels had a unit root. This is evidenced by the fact that the values of the adjusted t for all variables were less than zero.

**Table 5.3: Levin Lin Chu Tests for Panel Level Stationarity**

<b>Variable</b>	<b>Unadjusted t</b>	<b>Adjusted t</b>	<b>P value</b>
Market Share Price	-40.6138	-43.3921	0.0000
Debt to equity Ratio	-63.4425	-68.6300	0.0000
Retained Earnings Ratio	-5.4311	-5.8200	0.0000
Equity Ratio	-4.5e+02	-4.9e+02	0.0000

**Source: Author 2016**

#### **Testing for Autocorrelation**

The Wooldridge test for autocorrelation had a p value of 0.000, implying that the null hypothesis of no first order serial correlation should be rejected at the 5% level. This is evident in table 5.4 below.

**Table 5.4: Wooldridge Test for Autocorrelation in Panel Data**

Wooldridge test for autocorrelation in panel data
HO: no first-order autocorrelation
F (1, 29) = 10.002
Prob > F = 0.0037

**Source: Author 2016**

### **Testing for Heteroscedasticity**

The Likelihood-ratio test for heteroscedasticity, as shown in table 5.5 below, indicated the presence of heteroscedasticity. This is due to the fact that its p value was 0.0000.

**Table 5.5: Likelihood-Ratio Test for Heteroscedasticity**

Likelihood-ratio test	LR chi2(29) = 364.29
(Assumption: nested in hetero)	Prob > chi2 = 0.000

**Source: Author 2016**

### **5.2.1 Model Fitting**

Since diagnostic testing showed the data to have first order correlation of error terms and heteroscedasticity, the pooled OLS regression, fixed effects, or random effects panel regression models could not be fitted. This is because these three models assume that all assumptions of regression analysis are upheld. According to Reyna (2007) panel data should be analyzed by fitting a Prais Winsten Panel regression model with corrected standard errors model when there is heteroscedasticity and first order autocorrelation. The Prais Winsten procedure caters for autocorrelation while corrected standard errors take into account the effect of heteroscedasticity. The results of model fitting are shown in Table 5.6 below.

**Table 5.6: Prais Winsten Panel Regression with Corrected Standard Errors**

Praise-Winsten regression, heteroskedastic panels corrected standard errors						
Group variable:	Firmid		Number of obs	=	180	
Time variable:	Year		Number of groups	=	30	
Panels:	Heteroskedastic (balanced)		Obs per group: min	=	6	
Autocorrelation:	Panel-specific AR (1)		avg	=	6	
			max	=	6	
Estimated covariances	=	30	R- squared	=	0.3751	
Estimated autocorrelation	=	30	Wald chi2(3)	=	94.85	
Estimated coefficient	=	4	Prob >chi2	=	0.0000	
	Het-corrected					
MSP	Coef.	Std error	Z	p>(z)	(95 conf. interval)	
D/E ratio	18.10921	9.035376	2.00	0.045	.4001952	35.81822
RE ratio	251.8943	35.7605	7.04	0.000	181.805	321.9836
EQU ratio	162.273	43.44774	3.73	0.000	77.11694	247.429
_Cons	-90.15157	35.00279	-2.58	0.010	-158.7558	.890897
rhos =	.712765	.60088434	-.0041647	.7503363	-.4673945	-21.547371

MSP=Market Share Price ,D/E ratio=Debt to Equity ratio. RE ratio= Retained Earnings ratio, EQU ratio=Equity ratio and Cons=constant

**Source: Author 2016**

The results of Prais Winsten panel regression with corrected standard errors model fitting indicate that all indicators of capital structure had a significant impact on market share price. The respective regression coefficients and standard errors of the independent variables are debt to equity ratio (b=18.109, p=0.045), retained earnings ratio (b=251.894, P=0.000) and earnings ratio (b=162.273, p=0.000). Furthermore, the constant had a negative, significant effect of market share price (b=-90.152, p=0.010).

The results imply that all aspects of capital structure had a positive and significant effect of market share price. As such, the null hypothesis was rejected at the 5% level of significance and consequently the study failed to reject alternative hypothesis. Consequently, it is concluded that capital structure has a significant influence on the value of the firm. The empirical model for this relationship is framed as below.

$$FV = -90.152 + 18.109DER + 251.894RER + 162.273ER$$

Where:

FV = Firm Value

DER =Debt to Equity Ratio

RER= Retained Earnings Ratio

ER=Earnings Ratio

### **5.3 Moderating Effect of Macroeconomic Environment on the Relationship between Capital Structure and the Value of the Firm**

The second objective of the study was to investigate the moderating effect of the Macroeconomic environment on the Relationship between Capital structure and the value of the firm. The hypothesis that was tested in order to fulfil this objective was framed in the null form as below:

*H<sub>02</sub>: Macroeconomic environment does not significantly influence the relationship between capital structure and firm value.*

In testing the moderating effect of the macroeconomic environment on the relationship between capital structure and the value of the firm was assessed using the method proposed by Stone-Romero and Liakhovitski (2002). This involved testing the effects on the dependent variable (firm value) of capital structure, moderator variable (macroeconomic environment) and the respective interaction between capital structure and macroeconomic environment. In the first step of this procedure, the independent variable (capital structure) and moderating variable (macroeconomic environment) are jointly fitted in a panel regression model as regressors of the dependent variable (firm value). In the second step the independent variable, moderating variable, and a composite variable formed by multiplying the dependent variable by the moderating variable (interaction variable) are jointly regressed against the dependent variable. The moderating effect is deemed present if the extent to which variability in the dependent variable can be attributed to variability in the independent variables increases after inclusion of the interaction terms.



### 5.3.1 Step One of Testing the Moderating Effect: Estimate Joint Effect of Independent Variable and Moderating Variable on Dependent Variable

Estimation of the joint effect of capital structure and macroeconomic environment on firm value started with conducting diagnostic tests. This was done in order to appraise whether the assumptions of panel data analysis were fulfilled.

#### Diagnostic Testing

##### Testing for Multicollinearity

The test for multicollinearity indicated a high level of linear dependence amongst three indicators of capital structure, i.e Retained Earnings Ratio (VIF=1035.05), Equity Ratio (VIF=919.61), and Debt Ratio (VIF=1618.48). Debt to equity Ratio had an acceptable VIF (4.85) so it was deemed unaffected by multicollinearity. Macroeconomic variables however didn't exhibit any signs of multicollinearity, since GDP growth rate, inflation rate, and interest rate had VIFs of 1.68, 1.33, and 1.76 respectively. This is shown in table 5.7 below.

**Table 5.7: Test for Multicollinearity**

Variable	VIF	Tolerance
Debt to equity Ratio	4.85	0.2063
Retained Earnings Ratio	1035.05	0.001
Equity Ratio	919.61	0.0011
Debt Ratio	1618.48	0.0006
GDP Growth Rate	1.68	0.5969
Inflation Rate	1.33	0.7509
Interest rate	1.76	0.5679
Mean VIF	511.82	

**Source: Author 2016**

The "Debt Ratio" variable was dropped from the analysis since it had the highest VIF amongst the regressors. Consequently, the VIFs of other variables dropped to acceptable levels (<10). This is shown in table 5.8 below.

**Table 5.8: Test for Multicollinearity after Dropping the “Debt Ratio” Independent Variable**

<b>Variable</b>	<b>VIF</b>	<b>Tolerance</b>
Debt to equity Ratio	4.85	0.2063
Retained Earnings Ratio	2.86	0.35
Equity Ratio	3.79	0.2636
GDP Growth Rate	1.65	0.6055
Inflation Rate	1.33	0.7543
Interest rate	1.76	0.5682
Mean VIF	2.71	

**Source: Author 2016**

### **Testing for Panel Level Stationarity**

Pertaining the Levin Lin Chu tests for panel level stationarity, the results show that all variables were stationary. This is since all adjusted t statistics of the Levin Lin Chu tests, as shown in table 5.9, were less than zero.

**Table 5.9: Levin Lin Chu Tests for Panel Level Stationarity**

<b>Variable</b>	<b>Unadjusted t</b>	<b>Adjusted t</b>	<b>P value</b>
Market Share Price	-40.6138	-43.3921	0.0000
Debt to equity Ratio	-63.4425	-68.6300	0.0000
Retained Earnings Ratio	-5.4311	-5.8200	0.0000
Equity Ratio	-4.5e+02	-4.9e+02	0.0000
GDP Growth Rate	-38.9818	-30.9174	0.0000
Inflation Rate	-21.2000	-16.1634	0.0000
Interest rate	-35.5483	-34.5161	0.0000

**Source: Author 2016**

### **Testing for Autocorrelation**

The Wooldridge test for autocorrelation in panel data, as per table 5.10 below indicated that the data had first order autocorrelation (p value=0.0000).

**Table 5.10: Wooldridge Test for Autocorrelation in Panel Data**

Wooldridge test for autocorrelation in panel data
H <sub>0</sub> : no first-order autocorrelation
F (1, 29) = 10.782
Prob > F = 0.0027

**Source: Author 2016**

### **Testing for Heteroscedasticity**

Additionally, the LR test for heteroscedasticity implied the presence of heteroscedasticity (p value=0.0000). This is shown in table 5.11

**Table 5.11: Likelihood-Ratio Test for Heteroscedasticity**

Likelihood-ratio test	LR chi2(29) = 318.48
(Assumption: nested in hetero)	Prob > chi2 = 0.0000

**Source: Author 2016**

### **Model Fitting**

Results of diagnostic tests indicated that not all assumptions of panel ordinary least squares regression have been met. In particular, the dataset has no multicollinearity (after dropping debt ratio) and there is panel level stationarity but there is presence of heteroscedasticity and serial correlation. This consequently implies that the pooled OLS, fixed effects and random effects models cannot be fitted to the data since they assume that all assumptions of panel ordinary least squares regression hold. The Prais Winsten Panel Regression model with corrected standard errors was consequently fitted on the datasets. Reyna (2007) suggests that in the presence of autocorrelation and heteroscedasticity, robust results can be obtained by fitting a Prais Winsten Panel Regression model that incorporates correction for standard errors.

**Table 5.12: Prais Winsten Panel Regression with Corrected Standard Errors**

Praise-Winsten regression, heteroskedastic panels corrected standard errors							
Group variable:	Firmid		Number of obs	=			180
Time variable:	Year		Number of groups	=			30
Panels:	Heteroscedastic (balanced)		Obs per group: min	=			6
Autocorrelation:	Panel-specific AR (1)		avg	=			6
			max	=			6
Estimated covariances	=	30	R- squared	=			0.3692
Estimated autocorrelation	=	30	Wald chi2(6)	=			95.05
Estimated coefficient	=	7	Prob >chi2	=			0.0000
Het-corrected							
MSP	Coef.	Std error	Z	p>(z)	(95 conf. interval)		
D/Eratio	16.65352	8.990988	1.85	0.064	-9.684969		34.27553
RE ratio	247.1112	35.53903	6.95	0.000	177.456		316.7665
EQUTratio	154.8962	43.90134	3.53	0.000	68.8512		240.9413
GDP_ratio	-.0462701	2.478981	-0.02	0.985	-4.904983		4.812443
INFL	.9610205	.987063	0.97	0.330	-.9735875		2.895628
INTR	-.4822216	1.622621	-0.30	0.766	-3.662501		2.698057
_Cons	-87.74652	40.00329	-2.19	0.028	-166.1515		-9.341513
rhos =	.7165726	.5898315	.06931	.7401676	-.4413028		.8873587

MSP=Market Share Price, D/E ratio=Debt to Equity ratio. RE ratio= Retained Earnings ratio, EQUTratio=Equity ratio, GDP ratio =GDP growth rate, INFL= Inflation, INTR=Interest rate and Cons=constant

**Source: Author 2016**

The results of regression analysis in table 5.12 above show that retained earnings ratio (b=247.111, p=0.000) and equity ratio (b=154.896, p=0.000) had a positive significant relationship with firm value. The constant also had a significant but negative relationship with firm value (b=-87.747, p=0.028). Debt to equity ratio (b=16.654, p=0.064) and inflation rate (b=0.961, p=0.330) had a positive but insignificant effect on firm value while the effect of GDP growth rate (b=-0.046, p=0.985) and Interest Rate (b=-0.482, p=0.766) on firm value was negative and insignificant. The results of step one indicate the variance of firm value accounted for by capital structure and macroeconomic environment is 36.92% before inclusion of interaction term (capital structure multiplied by macroeconomic environment). This implies that in step one 36.92% of variability in firm value could be attributed to variability in capital structure and macroeconomic environment.

The empirical model for this relationship can therefore be framed as:

$$FV = -87.747 + 16.654DER + 247.111RER + 154.896ER - 0.046GGR + INFR0.961 - INTR0.482$$

Where:

FV = Firm Value

DER =Debt to Equity Ratio

RER= Retained Earnings Ratio

ER=Earnings Ratio

GGR = GDP Growth Rate

INFR= Inflation Rate

INTR= Interest Rate

The model above can be further simplified by dropping the insignificant variables from it.

In essence, if the p value is greater than 5%, the effect of the pertinent regressor on the dependent variable is not different from that of zero. Four variables, i.e. debt to equity ratio, GDP growth rate, inflation rate, and interest rate were not significant. The model can therefore be rewritten as below:

$$FV = -87.747 + 247.111RER + 154.896ER$$

### **5.3.2 Step Two of Testing the Moderating Effect: Estimate Joint Effect of Independent Variable, Moderating Variable and Interaction Terms on Dependent Variable**

The second step of testing hypothesis two entailed estimating the joint effect of the independent variable (capital structure), moderating variable (macroeconomic environment), and interaction terms (capital structure\*macroeconomic environment) on

the dependent variable (firm value). It was envisaged that direct multiplication of the macroeconomic environment variable and the dependent variable to form the interaction term variables would yield the problem of multicollinearity. This is due to the fact that many of the various interaction terms would be having a direct linear relationship with each other. To avert this problem, the independent and macroeconomic environment variables were standardized through extracting their z scores that have a mean of zero and a standard deviation of one.

There were a total of nine interaction terms. These were created as linear combinations of the independent variable's indicators and the moderating variable's indicators as shown in table 5.13 below.

**Table 5.13: Interaction Terms**

Independent Variable	Moderating Variable			
		GDP Growth Rate	Interest Rate	Inflation Rate
	Debt to Equity Ratio	IT1	IT4	IT7
	Retention Ratio	IT2	IT5	IT8
Earnings Ratio	IT3	IT6	IT9	

Source: Author 2016

### Diagnostic Testing

#### Testing for Multicollinearity

Regardless of the fact that the interaction terms in table 5.13 were created using z scores of the components of independent and moderating variables, tests for multicollinearity revealed that three interaction terms (IT4, IT7 and IT8) had a correlation coefficient that was greater than 0.8 with three other interaction terms. This is shown in table 5.14 below. Consequently, these three variables were removed from further analysis.

**Table 5.14: Test for Multicollinearity**

	Debt to Equity Ratio	Retained Earnings Ratio	Equity Ratio	GDP Growth	Inflation Rate	Interest Rate	IT1	IT2	IT3	IT4	IT5	IT6	IT7	IT8	IT9
Debt to Equity Ratio	1														
Retained Earnings Ratio	-.487	1													
Equity Ratio	-.650	-.170	1												
GDP Growth Rate	-.009	.011	.000	1											
Inflation Rate	.061	-.026	.010	-.402	1										
Interest Rate	.043	-.054	.016	-.612	.462	1									
IT1	.754	-.212	-.292	.008	.126	.023	1								
IT2	-.785	.178	.443	-.012	-.099	-.008	-.305	1							
IT3	-.425	.337	.289	.005	-.108	-.057	-.257	.878	1						
<b>IT4</b>	-.785	.178	.443	-.012	-.099	-.008	<b>-.905</b>	<b>1.000</b>	<b>.878</b>	1					
IT5	.122	-.423	.213	.010	-.056	.003	.119	-.123	-.131	-.123	1				
IT6	.343	.241	-.525	.004	.087	.007	.288	-.459	-.274	-.459	-.762	1			
<b>IT7</b>	<b>-.825</b>	.337	.289	.005	-.108	-.057	<b>-.957</b>	.878	1.000	<b>.878</b>	-.131	-.274	1		
<b>IT8</b>	.343	.241	-.525	.004	.087	<b>.907</b>	.288	-.459	-.274	-.459	<b>-.862</b>	<b>1.00</b>	-.274	1	
IT9	.308	-.550	.278	-.005	-.028	.051	.318	-.152	-.462	-.152	.677	-.635	-.462	-.635	1

**Source: Author 2016**

### Testing for Stationarity

The Levin Lin Chu Stationarity tests as per table 5.15 below showed that the independent variable, moderating variable and interaction terms were stationary.

**Table 5.15: Levin Lin Chu Tests for Panel Level Stationarity**

Variable	Unadjusted t	Adjusted t	P value
Market Share Price	-40.6138	-43.3921	0.0000
Debt to equity Ratio	-63.4425	-68.6300	0.0000
Retained Earnings Ratio	-5.4311	-5.8200	0.0000
Equity Ratio	-4.5e+02	-4.9e+02	0.0000
GDP Growth Rate	-38.9818	-30.9174	0.0000
Inflation Rate	-21.2000	-16.1634	0.0000
Interest rate	-35.5483	-34.5161	0.0000
IT1	-34.9089	-37.7974	0.0000
IT2	-14.9097	-15.8535	0.0000
IT3	-9.0459	-9.4468	0.0000
IT5	-10.9211	-11.8601	0.0000
IT6	-3.8642	-3.5195	0.0000
IT9	-3.6e+02	-3.9e+02	0.0000

Source: Author 2016

### Testing for Autocorrelation

The Wooldridge test for autocorrelation in panel data, as shown in table 5.16 indicated the presence of autocorrelation.

**Table 5.16: Wooldridge Test for Autocorrelation in Panel Data**

Wooldridge test for autocorrelation in panel data
HO: no first-order autocorrelation
$F(1, 29) = 9.968$
$\text{Prob} > F = 0.0037$

Source: Author 2016

### Testing for Heteroscedasticity

The LR test for heteroscedasticity in table 5.17 below yielded evidence of a strong form of homoscedasticity (no heteroscedasticity). This is because its p value was 1.0000.



**Table 5.17: Likelihood-Ratio Test for Heteroscedasticity**

Likelihood-ratio test	LR chi2(29) =	-406.00
(Assumption: hetero nested in)	Prob > chi2 =	1.0000

**Source: Author 2016****Model Fitting**

Diagnostic testing shows that the data violated only the CLRM assumption of no autocorrelation. Consequently, the researcher fitted a normal Prais Winsten Panel regression model without correction for standard errors since there was no heteroscedasticity. The results of this model fitting are shown in table 5.18 below.

**Table 5.18: Model Fitting: Prais-Winsten Panel Regression**

Prais-Winsten regression, correlated panels corrected standard errors (PCSEs)						
Group variable:	Firmid		Number of obs	=	180	
Time variable:	Year		Number of groups	=	30	
Panels:	Heteroskedastic (balanced)		Obs per group: min	=	6	
Autocorrelation:	Panel-specific AR (1)			avg	=	6
				max	=	6
Estimated covariances	=	30	R- squared	=	0.4116	
Estimated autocorrelation	=	30	Wald chi2(12)	=	74.22	
Estimated coefficient	=	13	Prob >chi2	=	0.0000	
	Het-corrected					
MSP	Coef.	Std error	Z	p>(z)	(95 conf. interval)	
D/E ratio	-64.26077	170.7753	-0.38	0.707	-398.9742	270.4527
RE ratio	17.69756	70.35503	0.25	0.801	-120.1958	155.5909
EQU ratio	-20.64449	96.9668	-0.21	0.831	-210.6959	169.4069
GDP ratio	-3.797203	2.736922	-1.39	0.165	-9.161472	1.567067
INFL	4.49967	1.997061	2.25	0.024	.5855025	8.413837
INTR	-6.495636	3.062518	-2.12	0.034	-12.49806	-.4932112
IT1	8.486513	4.625978	1.83	0.067	-5802378	17.55326
IT2	67.35739	22.82008	2.95	0.003	22.63085	112.0839
IT3	-17.335	48.19786	-0.36	0.719	-111.8011	77.13107
IT5	38.51985	11.02093	3.50	0.000	26.91923	60.12048
IT6	58.29853	18.72189	3.11	0.002	21.60429	94.99277
IT9	17.62323	8.826373	2.00	0.046	.3238568	34.9226
_cons	31.93675	29.2985	1.09	0.276	-25.48726	89.36077
rhos =	.6840865	.7174212	-.0633256	-.0033429	.3380998	.7763922

MPS=Market Share Price, D/E ratio=Debt to Equity ratio. RE ratio= Retained Earnings ratio, EQU ratio=Equity ratio, GDP ratio =GDP growth rate, INFL= Inflation, INTR=Interest rate and cons=constant

**Source: Author 2016**

The interaction terms are:

IT1 GDP Growth Rate and Debt to Equity Ratio Interaction Term

IT2 GDP Growth Rate and Retained Earnings Ratio Interaction Term

IT3 GDP Growth Rate and Equity Ratio Interaction Term

IT5 Inflation Rate and Retained Earnings Ratio Interaction Term

IT6 Inflation Rate and Equity Ratio Interaction Term

IT9 Interest rate and Equity Ratio Interaction Term

	Does the moderator have a moderating effect on the relationship between the respective independent variables and the dependent variable?		
	Moderating Variable		
independent variable	<b>GDP Growth Rate</b>	<b>Interest Rate</b>	<b>Inflation Rate</b>
<b>Debt to Equity Ratio</b>	No (IT1)	Not tested (IT4)	Not tested (IT7)
<b>Retention Ratio</b>	Yes (IT2)	Yes (IT5)	Not tested (IT8)
<b>Earnings Ratio</b>	No (IT3)	Yes (IT6)	Yes (IT9)

**Source: Author 2016**

After inclusion of interaction terms between capital structure and macroeconomic environment (capital structure multiplied by macroeconomic environment), the R-squared of the regression equation improved from 0.3692 to 0.4116 .The results of step two indicate that change in variation of firm value (change in R-squared ) equal to 0.0424 (0.4116-0.3692) after inclusion of the interaction term .The interaction term was also statistically significant indicating that macroeconomic environment had a moderating effect on the relationship between capital structure and firm value.. Based on the above results the null hypothesis was rejected and consequently the study failed to reject alternative hypothesis .Consequently, it was concluded that macroeconomic environment has a significant moderating influence between capital structure and firm value.

## **5.4 Intervening Effect of Firm efficiency on the Relationship between Capital**

### **Structure and the Value of the Firm**

This part relates to the third objective of the study. The researcher tested the intervening effect of firm efficiency (as measured by cost efficiency, operational efficiency, and profit efficiency). Hypothesis three was framed in the null below:

*H<sub>03</sub>: Firm's efficiency do not have a significant influence on the value of the firm.*

Four steps were followed to test the Intervening effect in line with the process advocated by Baron and Kenny (1986). In step one of testing this effect, regression analysis was performed to assess the relationship between (dependent variable) and (independent variable) while ignoring the mediator. In step two, panel regression was carried out between the independent variables (capital structure) and the intervening variables (firm efficiency) while ignoring the dependent variable (firm value). In the third step of the mediation analysis, regression analysis was performed to assess the relationship between firm efficiency (intervening variable) and firm value (dependent variable) while ignoring the independent variable (capital structure). The fourth step of the mediation analysis was performed to assess the joint effect of firm's efficiency (intervening variable) and capital structure (independent variable) on firm value (dependent variable). Intervention is deemed to occur if capital structure predicts firm value; capital structure predicts firm efficiency and firm efficiency predict firm value. An additional requirement to validate the presence of the intervening effect is that capital structure should predict firm value in a model in which firm efficiency are included jointly with capital structure as regressors.

### 5.4.1 Step One of Testing the Intervening Effect: Estimate Effect of Independent Variable on Dependent Variable

In step one of testing the intervening effect of firm efficiency on firm value, regression analysis was performed to assess the relationship between (dependent variable) and (independent variable) while ignoring the mediator. This is identical to performing the regressions under hypothesis one in section 5.2. The result of regression analysis in this section (table 5.6) is replicated below for convenience.

**Table 5.6: Prais Winsten Panel Regression with Corrected Standard Errors**

Praise-Winsten regression, heteroskedastic panels corrected standard errors						
Group variable:	Firmid		Number of obs	=	180	
Time variable:	Year		Number of groups	=	30	
Panels:	Heteroskedastic (balanced)		Obs per group: min	=	6	
Autocorrelation:	Panel-specific AR (1)		avg	=	6	
			max	=	6	
Estimated covariances	=	30	R- squared	=	0.3751	
Estimated autocorrelation	=	30	Wald chi2(3)	=	94.85	
Estimated coefficient	=	4	Prob >chi2	=	0.0000	
	Het-corrected					
MSP	Coef.	Std error	Z	p>(z)	(95 conf. interval)	
D/E ratio	18.10921	9.035376	2.00	0.045	.4001952	35.81822
RE ratio	251.8943	35.7605	7.04	0.000	181.805	321.9836
EQU ratio	162.273	43.44774	3.73	0.000	77.11694	247.429
_Cons	-90.15157	35.00279	-2.58	0.010	-158.7558	-21.54737
rhos =	.712765	.60088434	-.0041647	.7503363	-.4673945	.8908971

MSP=Market Share Price, D/E ratio=Debt to Equity ratio. RE ratio= Retained Earnings ratio, EQU ratio=Equity ratio and cons=constant

**Source: Author 2016**

As evident in the table above, all the components of the independent variable had a positive and significant effect on the dependent variable. The overall model was also significant (p value=0.0000) at the 5% level. The model in step one was specified as:

$$FV = -90.152 + 18.109DER + 251.894RER + 162.273ER$$

Where:

FV = Firm Value

DER =Debt to Equity Ratio

RER= Retained Earnings Ratio

ER=Equity Ratio

#### **5.4.2 Step Two of Testing the Intervening Effect: Estimate Effect of Independent Variable on Intervening Variable**

Step two involved testing the effect of the independent variables on their corresponding intervening variables. The effects of Debt to Equity Ratio on Cost Efficiency, Retained Earnings Ratio on Operational efficiency, and Equity Ratio on Profit Efficiency were tested.

##### **5.4.2.1 Panel regression of Debt to Equity Ratio as predictor and Cost Efficiency as the Response Variable**

#### **Diagnostic Testing**

##### **Testing for Multicollinearity**

Table 5.20 below indicates that there was no multicollinearity between the debt to equity Ratio and cost efficiency variables.

**Table 5.20: Test for Multicollinearity**

<b>Variable</b>	<b>VIF</b>	<b>Tolerance</b>
Debt to equity Ratio	1	0.998
Cost Efficiency	1	0.998

**Source: Author 2016**

##### **Testing for Stationarity**

As per table 5.21, both variables were stationary.

**Table 5.21: Levin Lin Chu Tests for Panel Level Stationarity**

<b>Variable</b>	<b>Unadjusted t</b>	<b>Adjusted t</b>	<b>P value</b>
Debt to equity Ratio	-63.4425	-68.6300	0.0000
Cost Efficiency	-3.5e+02	-3.8e+02	0.0000

**Source: Author 2016**

### Testing for Autocorrelation

Table 5.22 below shows that there was autocorrelation in the debt to equity Ratio and cost efficiency variables.

**Table 5.22: Wooldridge Test for Autocorrelation in Panel Data**

xtserial c_eff d2eqratio
Wooldridge test for autocorrelation in panel data
HO: no first-order autocorrelation
F (1, 29) = 19.777
Prob > F = 0.0001

**Source: Author 2016**

### Testing for Heteroscedasticity

According to table 5.23, the likelihood ratio test showed the presence of heteroscedasticity.

**Table 5.23: Likelihood-Ratio Test for Heteroscedasticity**

Likelihood-ratio test	LR chi2(29) = 116.54
(Assumption: nested in hetero)	Prob > chi2 = 0.0000

**Source: Author 2016**

### Model Fitting

Consequently, the Prais-Winsten Panel Regression model with Corrected Standard Errors was fitted. This is because there was evidence of heteroscedasticity and autocorrelation on diagnostic testing. Results of fitting this model are shown in table 5.24 below.

**Table 5.24: Model Fitting: Prais Winsten Panel Regression with Corrected Standard Errors**

Prais-Winsten regression, heteroskedastic panels corrected standard errors						
Group variable:	Firmid		Number of obs	=	180	
Time variable:	Year		Number of groups	=	30	
Panels:	Heteroskedastic (balanced)		Obs per group: min	=	6	
Autocorrelation:	Panel-specific AR (1)		avg	=	6	
			max	=	6	
Estimated covariances	=	30	R- squared	=	02402	
Estimated autocorrelation	=	30	Wald chi2(1)	=	1.35	
Estimated coefficient	=	2	Prob >chi2	=	0.2461	
	Het-corrected					
CEFF	Coef.	Std error	Z	p>(z)	(95 conf. interval)	
D/E ratio	.0117507	.0101312	1.16	0.246	-.0081062	.0316076
_cons	.1868975	.0148099	12.62	0.000	.1578707	.2159243
rhos =	.4816838	.5796946	.7745248	.476727	.8317645	.8773292

CEFF=Cost Efficiency and D/E=Debt Equity ratio and cons=Constant

**Source: Author 2016**

As evident above, the results indicate that the effect of debt to equity ratio on cost efficiency was not significant. As such, the conclusion is that cost efficiency has no intervening effect

**5.4.2.2 Panel Regression of Retained Earnings Ratio as Predictor and Operational Efficiency as the Response Variable**

**Diagnostic Testing**

**Testing for Multicollinearity**

As per table 5.25 below, the tests for multicollinearity between Retained Earnings Ratio and Operational efficiency show that there was no multicollinearity between these two variables.

**Table 5.25: Test for Multicollinearity**

Variable	VIF	Tolerance
Retained Earnings Ratio	1.01	0.9930
Operational efficiency	1.01	0.9930

**Source: Author 2016**

### Testing for Stationarity

As per table 5.26 below, Levin Lin Chu Tests showed that both Retained Earnings Ratio and Operational efficiency variables were stationary.

**Table 5.26: Levin Lin Chu Tests for Panel Level Stationarity**

Variable	Unadjusted t	Adjusted t	P value
Retained Earnings Ratio	-5.4311	-5.8200	0.0000
Operational efficiency	-1.4e+02	-1.5e+02	0.0000

**Source: Author 2016**

### Testing for Autocorrelation

According to table 5.27 below, there was no autocorrelation in the data for Retained Earnings Ratio and Operational efficiency variables.

**Table 5.27: Wooldridge Test for Autocorrelation in Panel Data**

xtserial oeff r_ratio
Wooldridge test for autocorrelation in panel data
HO: no first-order autocorrelation
F (1, 29) = 3.967
Prob > F = 0.0559

**Source: Author 2016**

### Testing for Heteroscedasticity

The likelihood ratio test, as per table 5.28 indicates the presence of heteroscedasticity. This is due to the fact that its p value was 0.0000<5%.



**Table 5.28: Likelihood-Ratio Test for Heteroscedasticity**

Lrttest hetero	df (29)		
Likelihood-ratio test	LR chi2(29)	=	114.16
(Assumption: nested in hetero)	Prob > chi2	=	0.0000

**Source: Author 2016**

**Specification Test**

Due to the fact that diagnostic testing showed that there was no autocorrelation but there was presence of heteroscedasticity, prais winsten Panel Regression cannot be conducted since these models are only appropriate where autocorrelation is present (they incorporate correction for autocorrelation). A normal panel model with corrected standard errors (to take into account the aspect of heteroscedasticity) should be fitted. The researcher utilized the Hausman specification test to select the appropriate panel regression model. The results of the Hausman test, as shown in table 5.29 below, implied that the random effects model should be fitted since the p value wasn't significant.

**Table 5.29: Hausman Test**

Coefficients				
	(b) Fixed	(B) Random	(b-B) Difference	Sqrt (diag) (V_b-V_B) S.E.
r_ratio	.0749846	.0329692	.0420154	.034674
b = consistent under HO and Ha; obtained from xtreg				
B = inconsistent under Ha, efficient under Ho; obtained from xtreg				
Test: H0: difference in coefficient not systematic				
	Chi2(1) =	(b-B) [(V_b-V_B) (-1)] (b-B)		
		1.47		
	=			
	prob>chi2 =	0.2256		

**Source: Author 2016**

## Model Fitting

The random effects model was fitted while selecting the option of robust standard errors (to handle heteroscedastic data). The results of model fitting are shown in table 5.30 below.

**Table 5.30: Model Fitting: Random Effects Regression with Robust Standard Errors**

Random Effects regression, heteroskedastic panels corrected standard errors						
Random – effects GLS regression			Number of obs	=	180	
Group variable:	Firmid		Number of groups	=	30	
R- sq :						
	Within = 0.0058		Obs per group: min	=	6	
	Between = 0.0273		avg	=	6.0	
	Overall = 0.0070		max	=	6	
			Wald chi2(1)	=	0.13	
Corr (u_1, X)	= 0 (assumed)		Prob >chi2	=	0.7159	
(std. err. Adjusted for 30 clusters in firmid)						
	Robust					
	Coef.	Std error	Z	p>(z)	(95 conf. interval)	
OEFF	.0329692	.0905748	0.36	0.716	-.1445541	.2104925
RE ratio	.6484652	.0367442	17.65	0.000	.5764478	.72014826
_cons	.10640215					
Sigma_u	.09032067					
Sigma_e	.58120425					
rho =						

OEFF=Operational Efficiency, RE=Retained Earnings ratio

### Source: Author 2016

The results indicate that the effect of retained earnings ratio on operational efficiency was not significant. As such, the conclusion is that operational efficiency has no intervening effect.

### 5.4.2.3 Panel regression of Equity Ratio as Predictor and Profit Efficiency as the Response Variable

#### Diagnostic Testing

#### Testing for Multicollinearity

Table 5.31 below shows that both the Equity Ratio and Profit Efficiency variables didn't have multicollinearity.

**Table 5.31: Test for Multicollinearity**

Variable	VIF	Tolerance
Equity Ratio	1.01	0.9927
Profit Efficiency	1.01	0.9927

Source: Author 2016

#### Testing for Stationarity

As per table 5.32, Levin Lin Chu Tests indicated that both variables were stationary.

**Table 5.32: Levin Lin Chu Tests for Panel Level Stationarity**

Variable	Unadjusted t	Adjusted t	P value
Equity Ratio	-4.5e+02	-4.9e+02	0.0000
Profit Efficiency	-30.7211	-32.0806	0.0000

Source: Author 2016

#### Testing for Autocorrelation

According to table 5.33, there was no autocorrelation in the data for the Equity Ratio and Profit Efficiency variables.

**Table 5.33: Wooldridge Test for Autocorrelation in Panel Data**

xtserial p_eff e_ratio	
Wooldridge test for autocorrelation in panel data	
HO: no first-order autocorrelation	
F (1, 29)	= 0.387
Prob > F	= 0.5390

Source: Author 2016

**Testing for Heteroscedasticity**

The Likelihood-Ratio Test yielded evidence of heteroscedasticity between equity ratio profit efficiency variables. This is as per table 5.34 below.

**Table 5.34: Likelihood-Ratio Test for Heteroscedasticity**

Likelihood-ratio test	LR chi2(29)	=	80.89
(Assumption: nested in hetero)	Prob > chi2	=	0.0000

Source: Author 2016

**Specification Test**

The researcher used the Hausman specification test to select the appropriate panel model to analyze the relationship between Equity Ratio and Profit Efficiency. As per table 5.35, this test showed that the random effects model should be fitted since its p value was greater than 5%.

**Table 5.35: Hausman Specification Test**

Coefficients				
	(b) Fixed	(B) Random	(b-B) Difference	Sqrt (diag) (V_b-V_B) S.E.
r_ratio	-.1595976	-.1469287	-.0126689	.0249649
b = consistent under H0 and Ha; obtained from xtreg				
B = inconsistent under Ha, efficient under Ho; obtained from xtreg				
Test: H0: difference in coefficients not systematic				
	Chi2(1) =	(b-B) [(V_b-V_B) (-1)] (b-B)		
	=	0.26		
	prob>chi2 =	0.6118		

Source: Author 2016

## Model Fitting

The researcher fitted a random effects regression model with Equity Ratio as predictor and Profit Efficiency as the response variable. The results are shown in table 5.36 below.

**Table 5.36: Model Fitting: Random Effects Regression with Robust Standard Errors**

Praise-Winsten regression, heteroskedastic panels corrected standard errors						
Random – effects GLS regression			Number of obs	=	180	
Group variable:	Firmid		Number of groups	=	30	
R- sq :	Within = 0.0249		Obs per group: min	=	6	
	Between = 0.0002		avg	=	6.0	
	Overall = 0.0073		max	=	6	
			Wald chi2(1)	=	1.28	
Corr (u_1, X)	= 0 (assumed)		Prob >chi2	=	0.2586	
			(std. err. Adjusted for 30 clusters in firmid)			
Robust						
p_eff	Coef.	Std error	Z	p>(z)	(95 conf. interval)	
e_ratio	-.1469287	.1300656	-1.13	0.259	-.4018527	.1079953
_cons	.5889707	.0731784	8.05	0.000	.4455436	.7323977
Sigma_u	.12101249					
Sigma_e	.11913368					
rho =	.50782315	(fraction of variance due to u_i)				

CEFF=Cost Efficiency, RE=Retained Earnings ratio

**Source: Author 2016**

As shown in table 5.36 above, the result indicates that the effect of equity ratio on profit efficiency was not significant. As such, the conclusion is that profit efficiency has no intervening effect.

**Table 5.37: Summary of Results of Intervention Assessment (Steps One and Two)**

Independent Variable	Step One (*)	Intervening Variable	Step two (*)
Debt to Equity Ratio	Yes	Cost Efficiency	No
Retained Earnings Ratio	Yes	Operational Efficiency	No
Equity Ratio	Yes	Profit Efficiency	No
* Does independent variable have a significant effect on dependent variable?			
** Does independent variable have a significant effect on intervening variable?			

**Source: Author 2016**

Table 5.37 above summarizes the results of intervention assessment. Since there is no apparent effect of the independent variables on the intervening variables, the conclusion is that there is no intervening effect and hence steps three and four are not necessary. In hypothesis testing, we fail to reject null hypothesis three ( $H_{03}$ ). It is therefore concluded that firm efficiency have no intervening effect on the relationship between capital structure and firm value.

## **5.5 Joint Effect of Capital Structure, Macroeconomic Environment and Firm**

### **Efficiency on the Value of the Firm**

This part relates to the fourth objective of the study. The researcher tested the joint effect of capital structure, macroeconomic environment and firm efficiency on the value of the firm. Hypothesis four was framed in the null below:

*H<sub>04</sub>: capital structure, macroeconomic environment and firm's efficiency do not have a significant joint influence on the value of the firm.*

### **Diagnostic Tests**

#### **Testing for Multicollinearity**

As per table 5.38 below, there was high multicollinearity of three independent variable indicators initially but the indicators of the moderating variable and intervening variable had acceptable VIFs. Retained Earnings Ratio, Equity Ratio, and Debt Ratio had very big VIFs of 1051.27, 934.28, and 1646.73 respectively. Only Debt to equity Ratio had a VIF which is less than 10. Consequently, Debt Ratio was removed from further analysis since it had the highest VIF, meaning it had most collinearity with other variables.

**Table 5.38: Test for Multicollinearity**

Variable	VIF	Tolerance
Debt to equity Ratio	4.94	0.2026
Retained Earnings Ratio	1051.27	0.001
Equity Ratio	934.28	0.0011
Debt Ratio	1646.73	0.0006
GDP Growth Rate	1.68	0.5951
Inflation Rate	1.33	0.7494
Interest rate	1.76	0.5677
Cost Efficiency	1.03	0.971
Operational Efficiency	1.1	0.9113
Profit Efficiency	1.12	0.8892
Mean VIF	364.52	

**Source: Author 2016**

On removal of Debt ratio, the VIFs of the remaining indicators dropped to acceptable levels. This is evident in table 5.39 below.

**Table 5.39: Test for Multicollinearity after Dropping the “Debt Ratio” Independent Variable**

Variable	VIF	Tolerance
Debt to equity Ratio	4.94	0.2026
Retained Earnings Ratio	2.99	0.3343
Equity Ratio	3.83	0.2611
GDP Growth Rate	1.66	0.6028
Inflation Rate	1.33	0.753
Interest rate	1.76	0.5681
Cost Efficiency	1.02	0.9825
Operational Efficiency	1.09	0.916
Profit Efficiency	1.12	0.8892
Mean VIF	2.19	

**Source: Author 2016**

### **Testing for Stationarity**

As shown in table 5.40, Levin Lin Chu Tests for Panel Level Stationarity indicated that all variable were significant at the 5% level of significance.

**Table 5.40: Levin Lin Chu Tests for Panel Level Stationarity**

Variable	Unadjusted t	Adjusted t	P value
Market Share Price	-40.6138	-43.3921	0.0000
Debt to equity Ratio	-63.4425	-68.6300	0.0000
Retained Earnings Ratio	-5.4311	-5.8200	0.0000
Equity Ratio	-4.5e+02	-4.9e+02	0.0000
GDP Growth Rate	-38.9818	-30.9174	0.0000
Inflation Rate	-21.2000	-16.1634	0.0000
Interest rate	-35.5483	-34.5161	0.0000
Cost Efficiency	-3.50E+02	-3.80E+02	0.0000
Operational efficiency	-1.40E+02	-1.50E+02	0.0000
Profit Efficiency	-30.7211	-32.0806	0.0000

**Source: Author 2016**

### Testing for Autocorrelation

The Wooldridge test for autocorrelation in panel data showed the presence of autocorrelation. This is as per table 5.41 below.

**Table 5.41: Wooldridge Test for Autocorrelation in Panel Data**

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
F (1, 29) = 11.567
Prob > F = 0.0020

**Source: Author 2016**

### Testing for Heteroscedasticity

The Likelihood-ratio test for Heteroscedasticity, as per table 5.42 below, indicated that there was homoscedasticity (no heteroscedasticity). This is due to the fact that its p value was 1.0000.

**Table 5.42: Likelihood-Ratio Test for Heteroscedasticity**

lrtest hetero.	df(29)
Likelihood-ratio test	LR chi2(29) = -528.54
(Assumption: hetero nested in)	Prob > chi2 = 1.0000

**Source: Author 2016**

### Model Fitting

Due to the presence of autocorrelation, a Prais Winsten panel regression model was fitted to the data set. Table 5.43 below shows the results of fitting this model.



Table 5.43: Prais Winsten Regression

Praise-Winsten regression						
Group variable:	Firmid		Number of obs	=	180	
Time variable:	Year		Number of groups	=	30	
Panels:	Correlated (balanced)		Obs per group: min	=	6	
Autocorrelation:	Panel-specific AR (1)		avg	=	6	
			max	=	6	
Estimated covariances	=	465	R- squared	=	0.3991	
Estimated autocorrelation	=	30	Wald chi2(9)	=	61.48	
Estimated coefficient	=	10	Prob >chi2	=	0.0000	
	Panel-corrected					
MSP	Coef.	Std error	Z	p>(z)	(95 conf. interval)	
D/E ratio	9.010331	9.364574	0.96	0.336	-9.343897	27.36456
RE ratio	208.8072	44.56352	4.69	0.000	121.4643	296.1501
EQU ratio	117.3783	50.54841	2.32	0.020	18.3052	216.4513
GDP ratio	-.2582593	1.711852	-0.15	0.880	-3.613428	3.096909
INFL	.9512799	.7999453	1.19	0.234	-.6165841	2.519144
INTR	-.2989509	1.14382	-0.26	0.794	-2.540798	1.942896
CEFF	30.63591	23.13363	1.32	0.185	-14.70517	75.977
OEFF	-44.99199	31.9643	-1.41	0.159	-107.6409	17.65688
PEFF	16.26704	15.81553	1.03	0.304	-14.73083	47.26491
_cons	-37.61336	29.81919	-1.26	0.207	-96.0579	20.83118
rhos =	-37.61336	.6163596	.0397814	.5771594	-.3076649	.8733896

MSP=Market Share Price, D/E ratio=Debt to Equity ratio. RE ratio= Retained Earnings ratio, EQU ratio=Equity ratio, GDP ratio =GDP growth rate, INFL= Inflation, INTR=Interest rate, CEFF=Cost Efficiency, OEFF=Operation Efficiency, PEFF=Profit Efficiency and cons=constant

**Source: Author 2016**

Prais Winsten regression showed that all variables were not significant except two measures of capital structure that is retained earnings ratio and equity ratio but jointly all the variables were statistically significant at 5% level of significance, hence the null hypothesis was rejected and consequently the study failed to reject the alternative hypothesis. It is therefore concluded that capital structure, macroeconomic environment, firm’s efficiency jointly have a significant influence on the firm value.

The joint regression model was simplified to include only the significant coefficients as

$$FV = -37.61336 + 208.8072RER + 117.3783ER$$

Where:

FV = Firm Value

RER= Retained Earnings Ratio

ER=Equity Ratio

## **5.6 Discussion of the Research Findings**

The research findings relating to the study research hypothesis are presented in section 5.6 In this section the meaning of those results, how they fit into existing knowledge are discussed and any deduced insights are presented.

### **5.6.1 Relationship between Capital Structure and Firm Value**

The first study objective was to establish the relationship between capital structure and value of firms listed at the Nairobi Securities Exchange.

The summary of the results of testing of hypothesis testing relating to the first study objectives are shown in Table 5.6. The results are that capital structure influences the value of the firm. The best predicting empirical model for this relationship is framed as

$$FV = -90.152 + 18.109DER + 251.894RER + 162.273ER$$

Where:

FV = Firm Value

DER =Debt to Equity Ratio

RER= Retained Earnings Ratio

ER=Equity Ratio

The result indicates that, as theory predicts that is capital structure positively influences the value of the firm. These results are similar to the studies by Holz (2002); Dessi and Robertson (2003) and Dalbor et al. (2007) who found that financial leverage positively affects the expected performance and value of firms in the sense that firms which utilizes

debts to finance assets and operations benefits from tax shields advantage by protecting firm profit from taxation and invests the protected earnings in the growth of the firm impacting in the future market value of the firm shares. However the results contradicts studies by Majumdar and Chibber (1997); Abor (2005); Kadongo, Mokoteli and Mwangi (2014) and Mwangi, Makau and Kosimbei (2014) who had found negative relationship between debt equity ratio and the value of the firm

### **5.6.2 Moderating Influence of Macroeconomic Environment in the Relationship between Capital Structure and Firm Value**

The second study objective was to determine the moderating effect of the macroeconomic environment on the relationship between capital structure and firm value. The summary of the results of testing of hypothesis relating to the second study objective are shown in Table 5.12. In the first step of estimating the joint effect of independent variable and moderating variable on dependent variable, the results of regression analysis show that retained earnings ratio ( $b=247.111$ ,  $p=0.000$ ) and equity ratio ( $b=154.896$ ,  $p=0.000$ ) had a positive significant relationship with firm value. The constant also had a significant but negative relationship with firm value ( $b=-87.747$ ,  $p=0.028$ ). Debt to equity ratio ( $b=16.654$ ,  $p=0.064$ ) and inflation rate ( $b=0.961$ ,  $p=0.0330$ ) had a positive but insignificant effect on firm value while the effect of GDP growth rate ( $b=-0.046$ ,  $p=0.985$ ) and Interest Rate ( $b=-0.482$ ,  $p=0.766$ ) on firm value was negative and insignificant. The R-squared was 0.3692. This implies that 36.92% of variability in firm value could be attributed to variability in capital structure and macroeconomic environment. On testing the effect of the interaction terms, GDP Growth Rate had a significant interaction effect on Retained Earnings Ratio; Interest Rate had a significant interaction effect on Retained Earnings Ratio and Earnings

Ratio; while Inflation Rate had a significant interaction effect on Earnings Ratio. The R-squared was 0.4116. This implies that 41.16 % of variability in firm value could be attributed to interaction effect of capital structure and macroeconomic environment.

The results of analysis indicate that, there is interaction between capital structure and macroeconomic environment which contributed to the change of variation of firm value by 0.0424(0.4116-0.3692). The best predicting empirical model for this relationship is framed as

$$FV = 31.93675 + 4.49967INL - 6.495636INTR + 67.35739IT_2 + 38.51985IT_5 + 58.29853IT_6 + 17.62323IT_9$$

Where:

FV = Firm Value

INFL = Inflation

INTR = Interest

IT<sub>2</sub> = GDP Growth rate and Retained Earnings ratio interaction term

IT<sub>5</sub> = Inflation rate and Retained Earnings ratio interaction term

IT<sub>6</sub> = Inflation rate and Equity ratio interaction term

IT<sub>9</sub> = Interest rate and Equity ratio interaction term

The study finding is consistent with the results by Fanelli and Keifman (2002) who argued that the country's financial markets, unstable economic environment and external events have effects on investment decisions of companies. This implies issuance of stocks by companies for financing is suitable only when the country is in good economic situations due to the fact that during the given periods the firms are able to issue shares at favourable terms which affects their overall firm value. The findings are also consistent

with the studies by Cheng and Tzeng (2011) who indicated that the higher firm quality may improve firm credit rationing by debt holders and equity holders depending on the economic environment prevailing in the country and better credit rating resulted in a reduced cost of capital and the reduced cost of obtaining finances in the market impacting on the firm operational costs, profits and dividends to be paid to the owners ultimately influencing the firm market share price. It is worth to note that none of the above studies had considered macroeconomic environment as a moderating variable but rather had considered the pairwise relationship between macroeconomic environment and firm value or between capital structure and macroeconomic environment

### **5.6.3 Intervening Effects of Firm's efficiency in the Relationship between Capital Structure and Firm Value**

The third study objective was to ascertain the intervening effects of firm's efficiency (operational, cost and profit efficiency) on the relationship between capital structure and firm value.

As presented in Tables 5.15 and 5.16 there is a no statistically significant relationship between capital structure, firm efficiency and value, which leads to the conclusion that there is no significant joint effect of capital structure, firm efficiency and value of firms listed at the Nairobi Securities Exchange. This finding thus leads to the failure to reject hypothesis three ( $H_{03}$ ) and rejected alternative hypothesis. This finding is inconsistent with empirical arguments by Schumpeter (1934); Greene and Segal (2004); Callen et al. (2005); Cummins and Xie (2008) and Norman, Hatfield & Cardinal (2010) which had found firm efficiency to have an influence on the firm value. However, the findings of the current studies are inconsistent with other studies which reported a negative relationship

between capital structure, firm productivity in terms of efficiency and firm value which includes studies by Pushner (1995) who found negative effect of leverage on firm performance measured as total factor productivity (TFP) in Japan. Booth et al (2001) in their study of 10 developing countries who found a negative relation between leverage and firm performance and firm value and Onaolapo and Kajola (2010) who found a significant negative impact of leverage, total factor productivity (TFP) on financial measures of Nigeria firms.

The concept of capital structure, firm efficiency and value have not been previously considered together as has been done in this study. The previous studies had looked at two variables that is firm efficiency and value at a time and thereby ignoring the joint effects of all three variables considered together.

#### **5.6.4 Joint Effects of Capital Structure, Macroeconomic Environment, Firm's efficiency and Firm Value**

The fourth study objective was to determine the joint effects of capital structure, macroeconomic environment, firm efficiency and firm value. The summary of the results of testing of the fourth research hypothesis relating to this study objective in Table 5.43 showed that all variables were not significant except two measures of capital structure that is retained earnings ratio and equity ratio but jointly all the variables were statistically significant at 5% level of significance, hence the null hypothesis was rejected and consequently the study failed to reject alternative hypothesis. It is therefore concluded that capital structure, macroeconomic environment, firm's efficiency jointly have a significant influence on the firm value. The best predicting empirical model for this relationship is framed as

$$FV = -37.61336 + 18.109DER + 208.8072RER + 117.3783ER$$

Where:

FV = Firm Value

RER= Retained Earnings Ratio

ER=Earnings Ratio

The concepts of capital structure, macroeconomic environment, firm efficiency and value have not been previously considered together as has been done in this study. However the result is consistent with the results from pairwise previous studies by Holz (2002); Dessi and Robertson (2003) and Dopuch and Gupta (1997) whereby a positive and significant relationship between the firm choice of capital and its return on assets return on equity and market share price was evidenced. Additionally Cheng and Tzeng (2011) supported the study findings by indicating that the higher the firm quality emerging from operational efficiency may improve firm credit rationing by debt holders and equity holders depending on the macroeconomic environment prevailing in the country. Their study concluded that better credit rationing resulted in a reduced cost of capital and increased firm value.

## **5.7 Chapter Summary**

The chapter started with testing of the study hypotheses followed by discussion of the results of hypothesis testing. For each of the four hypotheses, analysis started with the conducting of diagnostic testing to appraise the conformance of the data with assumptions of Ordinary Least Squares (OLS) panel regression analysis. This was to enable the researcher to use robust models that are an exact fit for the data's attributes thereby preventing the probability of making either a type 1 error (rejecting a correct null hypothesis) or a type 2 error (failing to reject an incorrect null hypothesis). The summary

of tests of research findings, research hypothesis, interpretation and implications of the results of the tests are presented in table 5.44 below.

**Table 5.44: Summary of Tests of Research Findings, Research Hypotheses, Interpretation and Implications**

<b>Objective</b>	<b>Hypothesis</b>	<b>Statistical Tests / Research Findings</b>	<b>Interpretation &amp; Implications</b>
To establish the influence of capital structure on the value of firms listed at the Nairobi Securities Exchange	H <sub>01</sub> : Capital structure does not have a significant influence on the value of firms listed at the Nairobi Securities Exchange	Panel regression analysis was used. The study established a statistically significant relationship between capital structure and firm value	The findings lead to rejection of hypothesis (H <sub>01</sub> ) and infer that capital structure significantly influence firm value
To determine the effect of macroeconomic environment on the relationship between capital structure and value of firms listed at the Nairobi Securities Exchange	H <sub>02</sub> : Macroeconomic environment does not have a significant moderating effect on the relationship between capital structure and value listed at the Nairobi Securities Exchange.	Stepwise regression analysis was used. The study established a statistically significant relationship between the interaction term of capital structure and macroeconomic environment and value of firms listed at the Nairobi Security Exchange.	The findings lead to rejection of hypothesis (H <sub>02</sub> ) and infer that macroeconomic environment significantly moderate the relationship between capital structure and value of firms listed at the Nairobi Securities Exchange.
To ascertain the effect of firm's efficiency on the relationship between capital structure and value of firms listed at the Nairobi Securities Exchange.	H <sub>03</sub> : Firm's efficiency do not have a significant intervening effect in the relationship between capital structure and value of firms listed at the Nairobi Securities Exchange.	Stepwise regression analysis was applied. The study findings infer that there is no statistically significant effect of firm efficiency on the relationship between capital structure and value of firms listed at the Nairobi Securities Exchange.	The finding fails to reject hypothesis (H <sub>03</sub> ) and infer that firm efficiency does not significantly intervene in the relationship between capital structure and value of listed at the Nairobi Securities Exchange.
To determine the joint effect of capital structure, macroeconomic environment, firm efficiency and value of firms listed at the Nairobi Securities Exchange	H <sub>04</sub> : Capital structure, macroeconomic environment, firm efficiency do not have a significant effect on the value of firms listed at the Nairobi Securities Exchange.	Panel regression analysis establish statistically significant relationships between capital structure, macroeconomic environment, firm's efficiency and value of firms listed at the Nairobi Securities Exchange,.	The findings lead to rejection of hypothesis (H <sub>04</sub> ) and infer that capital structure, macroeconomic environment, and firm's efficiency jointly significantly influence the value of firms listed at the Nairobi Securities Exchange.

Source: Author 2016



## **CHAPTER SIX**

### **SUMMARY, CONCLUSIONS AND RECOMMENDATIONS**

#### **6.1 Introduction**

This chapter contains a summary of the findings, conclusions and recommendations. The study set out to establish the relationship among capital structure, macroeconomic environment, firm efficiency and value of firms listed at the Nairobi Securities Exchange by testing four hypotheses that explored the four variables. The chapter presents the summary of findings from descriptive statistics for each variable, conclusions from these findings, study contributions and policy recommendations. The chapter also identifies the limitation of the study and future research directions.

#### **6.2 Summary of the Study**

The main objective of this study was to establish the effect of capital structure on the value of the firm. The study further analysed the influence of macroeconomic environment and firm efficiency on the relationship between capital structure and firm value. The study was anchored on MM theory of capital structure and used positivistic philosophy in testing four research hypothesis. The study utilized secondary data from non- financial firms listed at the Nairobi Securities Exchange. Further the study employed a descriptive longitudinal research design and used panel data analysis based on the Ordinary least squares model. The population of the study was 62 companies listed at the Nairobi Securities Exchange .Out of 42 non-financial institutions listed at the Nairobi Securities Exchange that the study initially targeted complete data was available for 30 companies. As such, the sample consisted of 30 non-financial institutions that traded consistently over the 2009 to 2014 period and whose data was available.

There was a relatively strongly negative correlation between debt to equity ratio and market share price. The correlation between retained earnings ratio was quite strong ( $r=0.387$ ) while the effect of equity ratio on market share price was relatively weak and insignificant at both 5% and 1% levels of significance. The strong, positive and significant correlation between retained earnings and market share price can be attributed to many factors. Most important of all, firms with high retention rates are viewed by the market as growth firms with huge prospects for the future. Finally, Debt Ratio and market share price had a relatively strongly, negative correlation ( $r = -.392$ ). The negative effect of the debt to equity ratio and debt ratio on the market share price showed a strong preference on unlevered stocks by investors. Due to mandatory interest and principal repayments, highly indebted firms tend to have less amounts of money that are available for distribution as dividends. Additionally, debt could send a signal that the financial health of a firm is in turmoil, thereby making it less attractive to investors.

For each of the four hypotheses, empirical analysis started with the conducting of diagnostic testing to appraise the conformance of the data with assumptions of Ordinary Least Squares (OLS) panel regression analysis and in situations where diagnostics tests revealed non-conformance with the assumptions of Ordinary Least Squares (OLS) panel regression analysis, Prais Winsten Panel Regression with corrected standard errors model was used. This was to enable the researcher to use robust models that are an exact fit for the data's attributes thereby preventing the probability of making either a type 1 error (rejecting a correct null hypothesis) or a type 2 error (failing to reject an incorrect null hypothesis).

With regards to testing hypothesis one, the results of Prais Winsten Panel Regression with corrected standard errors model fitting showed that all indicators of capital structure had a significant impact on market share price. The respective regression coefficients and standard errors of the independent variables are debt to equity rate ( $b=18.109$ ,  $p=0.045$ ), retained earnings ratio ( $b=251.894$ ,  $P=0.000$ ) and earnings ratio ( $b=162.273$ ,  $p=0.000$ ). Furthermore, the constant had a negative, significant effect of market share price ( $b=-90.152$ ,  $p=0.010$ ). The results imply that all aspects of capital structure had a positive and significant effect of market share price. As such, the null hypothesis was rejected at the 5% level of significance and consequently the study failed to reject alternative hypothesis.

The second objective of the study was to determine the moderating influence of the macroeconomic environment on the relationship between capital structure and the value of the firm. In testing the moderating influence of the macroeconomic environment on the relationship between capital structure and the value, a method proposed by Stone-Romero and Liakhovitski (2002) was used to assess the relationship. This involved testing the influence on the dependent variable (firm value) of capital structure, moderator variable (macroeconomic environment) and the respective interaction between capital structure and macroeconomic environment. In the first step of this procedure, the independent variable (capital structure) and moderating variable (macroeconomic environment) were jointly fitted in a panel regression model as regressors of the dependent variable (firm value). In the second step the independent variable, moderating variable, and a composite variable formed by multiplying the independent variable by the moderating variable (interaction variable) were jointly regressed against the dependent variable. The moderating influence was deemed present if the extent to which variability in the dependent variable could be

attributed to variability in the independent variables increases after inclusion of the interaction terms. The results of regression analysis in step one of testing for the moderating influence showed that retained earnings ratio ( $b=247.111$ ,  $p=0.000$ ) and equity ratio ( $b=154.896$ ,  $p=0.000$ ) had a positive significant relationship with firm value. The constant also had a significant but negative relationship with firm value ( $b=-87.747$ ,  $p=0.028$ ). Debt to equity ratio ( $b=16.654$ ,  $p=0.064$ ) and inflation rate ( $b=0.961$ ,  $p=0.0330$ ) had a positive but insignificant effect on firm value while the effect of GDP growth rate ( $b=-0.046$ ,  $p=0.985$ ) and Interest Rate ( $b=-0.482$ ,  $p=0.766$ ) on firm value was negative and insignificant. Regardless of the fact that the interaction terms were created using z scores of the components of independent and moderating variables, tests for multicollinearity revealed that three interaction terms (IT4, IT7 and IT8) had a correlation coefficient that was greater than 0.8 with three other interaction terms. Consequently, these three variables were removed from further analysis. Based on the above results of the moderation test, the null hypothesis was rejected and consequently the study failed to reject alternatively hypothesis. Consequently, it was concluded that macroeconomic environment had a significant moderating influence on the relationship between capital structure and firm value.

On the third objective of the study, the researcher tested the intervening effect of firm's efficiency (as measured by cost efficiency, operational efficiency, and profit efficiency) on the relationship between capital structure and firm value. Hypothesis testing results showed that there was no intervening effect of firm's efficiency. As such, the study failed to reject the null hypothesis.

The fourth study objective was to determine the joint effects of capital structure, macroeconomic environment, firm efficiency and firm value. The summary of the results of testing of the fourth research hypothesis relating to this study objective showed that all variables were not significant except two measures of capital structure that is retained earnings ratio and equity ratio but jointly all the variables were statistically significant at 5% level of significance, hence the null hypothesis was rejected and the study failed to reject the alternative hypothesis. It was therefore concluded that capital structure, macroeconomic environment, firm's efficiency jointly have a significant influence on the firm value.

### **6.3 Conclusions of the Study**

The results obtained from the tests of hypothesis for the first study objective showed that all aspects of capital structure had a positive and significant effect of market share price. Consequently, it was concluded that capital structure had a significant influence of the value of the firm and that 37.5 % of variability in firm value was attributed to variability in capital structure. The results in the second study objective showed that conditions for the existence of moderation were fulfilled in that macroeconomic environment moderated the relationship between capital structure and firm value. The interaction effect of capital structure and macroeconomic environment showed that the R-squared had improved from 0.369 in the first step of moderation to 0.4116 in step two a change of 0.0424(0.4116-0.3692).The results showed that variability in firm value could be attributed to the interaction effect between capital structure and macroeconomic environment.

Results of the study objective number three indicated that firm's efficiency did not intervene in the relationship between capital structure and firm value. The study had hypothesized that firm efficiency would significantly and positively influence the resultant firm market share price. This means that the availability of finances either from retained earnings, debt or equity to finance firm investments and operations determines whether the firm has resources to undertake improvements in the firm core processes resulting to efficiencies in firm's operations. Typically to obtain firm efficiencies in its core processes requires financial investments leading to heavy overall operations costs. As the operation costs increases there is likelihood of decrease in firm profits when the firm revenues are compared against the firm costs. Such a situation is likely to lead to reduced earnings, dividends to the owners of the firm and a decline in the firm market share price in the short run since the firm share price is information driven. The situation could reverse in the long run when the firm attains optimum efficiency gained from the initial investments in the improvements of its core processes and bounce back to profitability culminating with enhanced firm market share price. The efficiency with which firm resources are managed determines the competitiveness of the firm and hence the Kenyan firm manager should focus on complete description of the economic goals of the firms aimed at reducing the cost of inputs and maximize on the prices charged on the output (cost efficiency). This can only be achieved through efficient utilization of firm resources in a cost effective manner in order to maximize the firm revenues that impacts on the firm profit and eventually the firm market share price.

The results of the fourth study objective showed that capital structure, macroeconomic environment and firm efficiencies jointly had a statistically significant impact on the firm value in the sense that optimal capital structure combined with optimal efficiencies in the

firm core processes under a favourable macroeconomic environment positively impacts on the resultant firm market share price .However, the effect of the macroeconomic environment and firm efficiencies when taken individually was not significant.

#### **6.4 Contributions of the Study Findings**

The findings from this study contribute to the body of knowledge in the area of capital structure, macroeconomic environment, firm efficiency and value. This section highlights the study findings contribution to knowledge and benefits to Kenyan companies practice and policy.

##### **6.4.1 Contributions to Knowledge**

The results of this study add to existing knowledge in the area of capital structure, macroeconomic environment, firm's efficiency and firm value in three main ways:

First, the results of data analysis indicate that firms are relying more on equity capital than retained earnings and debt with the pecking order being equity, retained earnings and debt.

This means Kenyan firms are not taking advantage of tax shields benefits which arise from debt components in their capital structure. Kenyan firms should take advantage of tax shield benefits by using more debt in their capital structure and benefits from disciplinary role of debts which forces firm managers to manage the firm efficiently resulting to high values for their firms. At the same time firm managers should be cautious of level of indebtedness in their firms since higher levels of debts can significantly decrease the firm's net profit causing a drop in the stock price. An optimum level of both debt and equity is preferable in order to benefits from tax shields and influence and control in the management decisions through equity holder's representations in the board of directors driving up the firm's value.

The second contribution of this study is the test of the moderating influence of macroeconomic environment on the relationship between capital structure and firm value. The findings of this study indicate that capital structure, macroeconomic environment have a significant interaction effect on the firm value. Therefore the government has an obligation to regulate the financial sector through various fiscal and monetary policy interventions for the economy to support cost effective financing, this will positively impacts on the revenues , profitability and the resulting market values of Kenyan firms.

Third contribution is that Kenyan firms should make practical application of agency costs theory which postulates that financial leverage mitigates against the agency problems by using debts in their capital structure as a disciplinary mechanisms forcing corporate managers to operate their firms efficiently to enhance revenue generations to be used for paying mandatory principle and interest on the borrowed funds. Additionally equity holders should also play their role of exerting influence in managerial decisions towards improving efficiency in the operations and prevent wastages of free cash-flow of their firms through equity holders' representation in the board of directors. Further firm managers should continuously review past strategic decisions and incase those decisions were harmful to the firm, make a deliberate move to correct the situations. The combined approach is expected to enhance the value of Kenyan firms.

Finally this study extends capital structure firm value literature by demonstrating that the relationship is not direct but is rather moderated by macroeconomic environment and in some instances intervened by firm efficiency as long as well arraigned strategic choices were made in the formulations of the capital structure decisions. This can explain why many researchers who have tested the relationship between capital structure and firm value



have found contradictory results with some concluding the relationship between the variables to be positive, negative or not significant at all. This study is important since it has provided direction on how to integrate optimal financing strategy, efficient management of firm's resources utilizing the opportunities provided by a favourable macro economic environment in order to realise enhanced values of Kenyan firms. Further, the adverse effects as a result of unfavourable macroeconomic environment can be mitigated through practical application of agency cost theory by improving efficiencies in management of firm's resources resulting to sustained firm's value.

#### **6.4.2 Contributions to Managerial Policy and Practices**

The findings of this study are useful to various stakeholders including investors, corporate managers, regulators and the government.

The effects of capital structure on firm value as documented in this study help investors and corporate managers when financing their firm investment and operations. The corporate managers should increase use of debt capital when financing their firm investment and operations in order to maximize the tax shield benefits available to their firms. The use of debt capital also provides disciplinary mechanisms to firm's managers to manage the firm's resources efficiently. Equity holders on their part should play their rightful role of exerting influence and monitoring managerial decisions through their representation in the board of directors leading to higher value of their firms. Equity holders can also sacrifice current dividends (capitalization-RE) providing funds for firm's investment to generate better returns in future in order to improve value of their firms.

Based on the results of this study the government through Capital Markets Authority (CMA) and other stakeholders in the Kenyan corporate sector should develop appropriate policies in an attempt to organize the debt capital market to enable Kenyan corporate bodies get access to low cost long term debt capital to finance their investments and operations. It is important to establish appropriate trading rules and mechanisms to improve the efficiency of debt market as higher liquidity in secondary market generally reduces the cost of capital which will positively impacts in the value of Kenyan firms. The current study has revealed that Kenyan firms are relying more on costly equity finances instead of debt financing locking themselves out of the tax shields benefits meant to enhance the value of the firms listed at the Nairobi Securities Exchange.

The finding of this study is expected to guide managerial practitioners in the corporate sector to appreciate the linkage of the various financing methods and efficient management of firm's resource and also actualize practical application of agency cost theory in the management of their firm's affairs including but not limited to efficient management of firm resources. The government on the other hand has an obligation to provide stability of the macroeconomic environment through its fiscal and monetary interventions. This ensures low inflation rate, low tax rate, and high economic growth rate. Consequently, the cost of operational expenses will decline and firm profits increase. This causes the value of the firm to increase through a higher share price arising from higher dividends to shareholders. The findings of this study is expected to inform corporate managers on how to take advantage of the stable macroeconomic environment prevailing in the country and in some instances how to mitigate the adverse effects of unstable macroeconomic environment through increasing their cost efficiency and operational efficiency. The results

of the current study demonstrate that the firms are using more inputs for a unit of output compared to the best firm. Therefore, firm managers should sell their products at higher prices to break even especially when the firm outputs are not competitive in the market. The consequences of failing to do that is that, the revenues and profits of the firm will decline, dividends paid will go down and the market share price will drop. These adverse effects can be mitigated through improving firm's efficiencies through optimal investments in the firms' core processes translating into lower production costs and enhanced firm's profitability and eventually improvement in the firm's market value.

### **6.5 Limitations of the Study**

Although this study had some limitations, every effort was made to ensure that these limitations did not significantly affect the findings of the study. First, this study zeroed down on the firm efficiency in terms of operational, cost and profit efficiencies as an intervener, there are other firm efficiency measures such as age, size, asset and organizational structure which could also come into play as an aspect of competitive advantage likely to influence the relationship between capital structure and firm value.

Second, the study presumed existence of a linear relationship between capital structure, macroeconomic environment, firm efficiency and firm value. There is a possibility of the study variables having a different form of relationship like a curvilinear relationship that the current study did not explore.

Third, there was no focus on the different market segments to which the firms belong due to the fact the target firms were non-financial firms listed at the Nairobi Securities Exchange without differentiating between different market segments. Therefore, this study

could not bring out the differential impact of capital structure on firm value across market segments and lastly, there was no attempt to enquire into the stability of capital structures across time and across market segments and how this impacts on firm values.

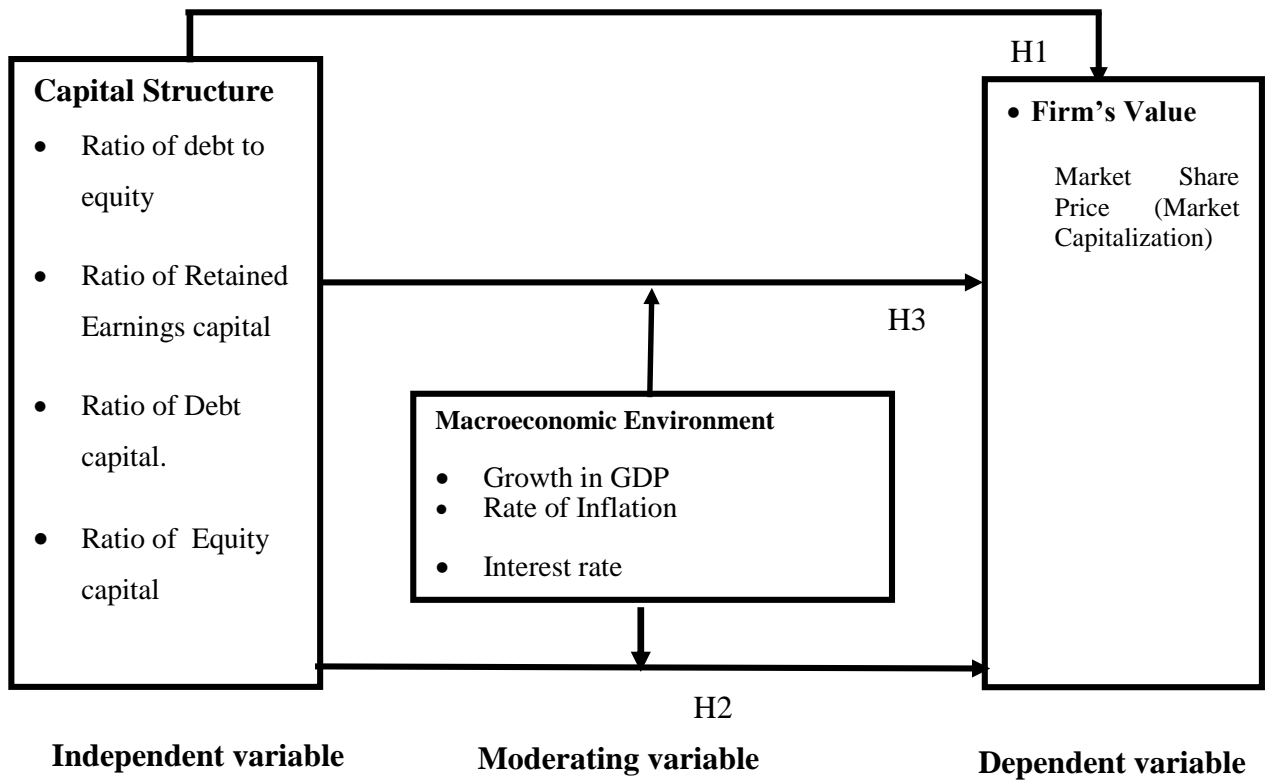
## **6.6 Recommendations for Further Research**

There are several issues that arise from this study that have implications for future research. First, it is evident from the analysis that the best measure of firm value is the market share price due to the fact that, market share price is information driven since it's a reflection of the strength of the firm balance sheet in terms of net worth and also the marketability of the firm products and the customer perception of the product in the market. The increased revenues results into enhanced earnings and dividends available to the owners of the firm which positively impacts on the market share price of the firm. Therefore, studies dealing with firm value should consider this variable first before any other measure of firm value since the measure is information driven.

Second, this study considered only the firm efficiency in terms of operational, cost and profit efficiencies and there is need to extend this study to cover other aspect firms' efficiency measures such as age, size, assets and organizational structure likely to give a firm a competitive advantage which is critical in generating enhanced future value for the firm.

Third, a focus on the different market segments is also recommended to bring out the differential impact of capital structure on firm value and fourthly, it is also necessary and important to enquire into the stability of capital structures across time and across market segments and how this impacts firm value. In particular, an assessment on whether firms with stable capital structure have higher or lower values.

**Table 6.1: Final Conceptual Model**



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## APPENDICES

### Appendix I: Introduction Letter



**UNIVERSITY OF NAIROBI**  
**COLLEGE OF HUMANITIES AND SOCIAL SCIENCES**  
**SCHOOL OF BUSINESS**  
**DOCTORAL STUDIES PROGRAMME**

Telephone: 4184160/1-5 Ext. 225  
Email: dsp@uonbi.ac.ke

P.O. Box 30197  
Nairobi, Kenya

18<sup>th</sup> December, 2015

**TO WHOM IT MAY CONCERN**

**RE: JOHN NJERU NJAGI: D80/72502/2012**

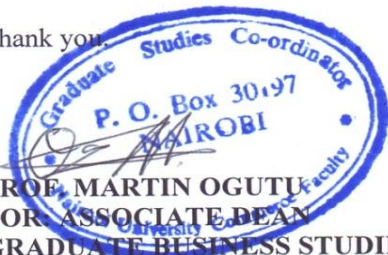
This is to certify that, **JOHN NJERU NJAGI: D80/72502/2012** is a Ph.D candidate in the School of Business, University of Nairobi. The title of his study is: **“Capital Structure, Macro-Economic Environment, Firm’s Characteristics and Value of Companies Listed at the Nairobi Securities Exchange”**.

The purpose of this letter therefore, is to kindly request you to assist and facilitate in carrying out the research/study in your organization. A questionnaire is herewith attached for your kind consideration and necessary action.

Data and information obtained through this exercise will be used for academic purposes only. Hence, the respondents are requested not to indicate their names anywhere on the questionnaire.

We look forward to your cooperation.

Thank you.

  
**PROF. MARTIN OGUTU**  
**FOR ASSOCIATE DEAN**  
**GRADUATE BUSINESS STUDIES**  
**SCHOOL OF BUSINESS**

MO/mwk

## Appendix II: Data Collection Form

Company-----

Date of incorporation-----

QUESTIONS	VARIABLE	Source: Financial Statements (Records Maintained at NSE) and CBK Data	2009	2010	2011	2012	2013	2014
<b>1 FIRM SPECIFIC efficiency</b>								
i	Turnover	Income statement						
<b>OPERATIONAL AND COST EFFICIENCY</b>								
1	Administrative costs	Income statement						
2	Distribution costs	Income statement						
3	Financing cost	Income statement						
4	Taxation cost	Income statement						
5	<b>Total Operational Costs</b>	<b>Income statement</b>						
<b>B PROFIT EFFICIENCY</b>								
1	Profit before tax (EBIT) to be computed using SFA)	Income statement						
2	Interest Costs (To be computed using SFA)	Income statement						
3	Taxation Costs (To be computed using SFA)	Income statement						

4	Profit after tax (To be computed by SFA)	Income statement						
5	Amount of Retained Earnings (To be computed using SFA)	Income statement						
<b>2 CAPITAL STRUCTURE</b>								
A	Amount in KSHS of Retained Earnings	Balance Sheet						
B	Amount in KSHS of debt capital							
C	Amount in KSHS of Equity capital	Balance Sheet						
<b>3 MACRO ECONOMIC ENVIRONMENT</b>								
A	Interest rate	KNBS and Central Bank of Kenya (Hand book/website)						
B	Growth in GDP	KNBS and Central Bank of Kenya (Hand book/website)						
C	Inflation	KNBS and Central Bank of Kenya (Hand book/website)						
<b>4 FIRM VALUE</b>								
A	No of Equity shares	Balance sheet						



B	Earnings per share	Income Statement/Balance sheet						
C	Share market price	Market information section, balance sheet/statement of financial position, financial ratios						
D	Market capitalization(Market price per share multiplied by outstanding equity shares)	Market information section, balance sheet/statement of financial position, financial ratios						

### **Appendix III: Listed Companies at NSE**

1. A Baumann &Co.
2. ARM Cement
3. Bamburi Cement
4. BOC Kenya Ltd
5. British American Tobacco Kenya Ltd.
6. Car and General
7. Carbacid Investments Ltd
8. CMC Holdings
9. Crown Paints Kenya
10. E.A Cables
11. E.A Portland
12. E.A. Breweries Ltd.
13. Eaagadds
14. Elliots
15. Eveready East Africa Ltd.
16. Express Ltd.
17. Hutchings Biemer Ltd.
18. Kakuzi Ltd.
19. Kapchorua Tea.
20. Kengen
21. Kenolkobil
22. Kensalt
23. Kenya Airways Ltd.
24. Kenya Orchards Ltd.
25. KP&LC

26. Limuru Tea.
27. Longhorn Kenya
28. Marshalls (E.A)
29. Mumias Sugar Company Ltd.
30. Nation Media Group Ltd.
31. Rea Vipingo Ltd.
32. Safaricom ltd
33. Sameer Africa
34. Sasini Tea Ltd.
35. Scan Group Ltd.
36. Standard Group Ltd.
37. Total Kenya
38. TPS (Serena) Ltd.
39. Uchumi Supermarkets Ltd.
40. Umeme Ltd.
41. Unga Group Ltd.
42. Williamson Tea.

**Source: Nairobi Securities Exchange: Hand book 2014**

## Appendix IV: Authorization Letter from NACOSTI



### NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: +254-20-2213471,  
2241349, 3310571, 2219420  
Fax: +254-20-318245, 318249  
Email: dg@nacosti.go.ke  
Website: www.nacosti.go.ke  
When replying please quote

9<sup>th</sup> Floor, Utalii House  
Uhuru Highway  
P.O. Box 30623-00100  
NAIROBI-KENYA

Ref. No. **NACOSTI/P/17/89520/18241**

Date: **12<sup>th</sup> July, 2017**

John Njeru Njagi  
University of Nairobi  
P.O. Box 30197-00100  
**NAIROBI.**

#### **RE: RESEARCH AUTHORIZATION**

Following your application for authority to carry out research on *“Capital structure, macroeconomic environment, firm’s characteristics and value of companies listed at the Nairobi Securities Exchange,”* I am pleased to inform you that you have been authorized to undertake research in **Nairobi County** for the period ending **12<sup>th</sup> July, 2018.**

You are advised to report to **the County Commissioner and the County Director of Education, Nairobi County** before embarking on the research project.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit **a copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.

**GODFREY P. KALERWA MSc., MBA, MKIM  
FOR: DIRECTOR-GENERAL/CEO**

Copy to:

The County Commissioner  
Nairobi County.


The County Director of Education  
Nairobi County.

*National Commission for Science, Technology and Innovation is ISO9001:2008 Certified*

## Appendix V: Research Clearance Permit from NACOSTI

**THIS IS TO CERTIFY THAT:** **MR. JOHN NJERU NJAGI** of **UNIVERSITY OF NAIROBI, 30197-100 NAIROBI,** has been permitted to conduct **research in Nairobi County** on the topic: **CAPITAL STRUCTURE, MACROECONOMIC ENVIRONMENT, FIRM'S CHARACTERISTICS AND VALUE OF COMPANIES LISTED AT THE NAIROBI SECURITIES EXCHANGE** for the period ending: **12th July, 2018**



**Permit No : NACOSTI/P/17/89520/18241**  
**Date Of Issue : 12th July, 2017**  
**Fee Received :Ksh 2000**



**Applicant's Signature** *John Njeru Njagi* **Director General**  
**National Commission for Science, Technology & Innovation**

**CONDITIONS**

1. The License is valid for the proposed research, research site specified period.
2. Both the Licence and any rights thereunder are non-transferable.
3. Upon request of the Commission, the Licensee shall submit a progress report.
4. The Licensee shall report to the County Director of Education and County Governor in the area of research before commencement of the research.
5. Excavation, filming and collection of specimens are subject to further permissions from relevant Government agencies.
6. This Licence does not give authority to transfer research materials.
7. The Licensee shall submit two (2) hard copies and upload a soft copy of their final report.
8. The Commission reserves the right to modify the conditions of this Licence including its cancellation without prior notice.

  
**REPUBLIC OF KENYA**  
  
**NACOSTI**  
**National Commission for Science, Technology and Innovation**  
**RESEARCH CLEARANCE PERMIT**  
**Serial No.A 14907**  
**CONDITIONS: see back page**