CORPORATE
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SECTION 3

BI-DIRECTIONAL RELATIONSHIP BETWEEN CAPITAL STRUCTURE AND FINANCIAL PERFORMANCE OF FIRMS LISTED ON THE NAIROBI SECURITIES EXCHANGE

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Abstract

Capital structure decisions are common across firms, yet capital structure theories lack a consensus on how much of debt capital firms should use to finance their operations. The main objective of this study was to investigate the bi-directional relationship between capital structure and financial performance of firms listed on the NSE. The study used canonical correlation technique to determine the bi-directional relationship between capital structure and performance. The result revealed that dominant capital structure indicator to be used in an analysis to predict performance is the total debt to the total asset ratio. In the case of performance, the two variables that relate to capital structure are book value to market value ratio and asset turnover ratio. The results support the conclusion that a bidirectional relationship exists between capital structure and debt capital.

Keywords: Capital Structure, Financial Performance, Canonical Technique, NSE

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1 Introduction

Since Modigliani and Miller (1958) there are departures from their original assertion that capital structure is irrelevant to a firm's value. The conclusion that a firm's choice of capital structure is inconsequential is inconsistent with the observation that firms invest significant resources in terms of managerial time and effort, legal fee and investment banking fees, in managing their capital structures. The justification of the deployment of such resources is that the choice of leverage is of critical importance to a firm's value; and that individual firms have an optimum capital structure (Berk and DeMarzo, 2011). The different theories that propagate competing models for financing decisions, confirm how complex the capital structure decision is, and require further research. The indefiniteness of the relation between capital structure and performance (value of the firm), made renowned scholars to refer to capital structure theory as a puzzle and a dilemma (Stiglitz, 1989; Myers, 1984). It is not clear whether it is the tradeoff theory or pecking order theory or agency theory that explains capital structure levels (Leary and Roberts, 2010; Korteweg, 2010; Lemmon and Zender, 2008).

That there is a gap in the capital structure debate is evidenced in Rajan and Zengales (1995) who stated that empirical relevance of the different theories are largely based on firms in the developed countries, and it is not at all clear how these facts relate to different theoretical models. Rajan and Zengalese (1995) further stated that without testing the robustness of these findings outside the environment in which they were uncovered, it is hard to determine whether these

empirical regularities are merely spurious correlations, let alone whether they support one theory or another. Tung (2009) referring to leverage as the unsung influence of private lenders in corporate governance argued that if the use of debt in financing corporations can mitigate agency costs by disciplining managers, then the proposition that performance depends on capital needs to be tested empirically; and if lenders consider firm performance in their lending decisions, this also need to be tested empirically. However, in addressing the relevancy or irrelevancy of capital structure choices, there is no consensus among researchers whether it is the capital structure that influences performance or performance that influence capital structure or both (Margaritis and Psillak, 2010; Margaritis and Psillak, 2007).

An understanding of the role that debt capital play in firms listed on the Nairobi Securities Exchange (NSE) and the impact of debt capital on performance, and whether managers consider profitability and efficiency of their firms in determining the amount to borrow are a critical capital structure decision. In order to improve firm performance, there is a need to identify interactive, intervening and motivational factors that influence manager's financial choices. The two concepts, performance and capital structure and their hypothesised impact on the value of the firm, require that managers make choices. An approach used to determine the quality of financial decisions is to observe the practices of established firms. In interrogating these two concepts this study tested the primary judgment of managers in relation to capital structure decisions. The findings of this study are useful in making capital structure decisions of firms listed on the NSE.

In most firms listed on the NSE, managers are separated from owners, an arrangement that result into agency relationship. However, a prevalent claim is that due to the separation of ownership and control in large firms, managers have little incentive to work in the interest of shareholders, doing so is against a manager's own interest (Berk and DeMarzo, 2011; WahyuArio, and Abdul Ghafar, 2006). A manager who acts in his or her own best interests rather than those of the shareholders creates a dilemma for shareholders, while a manager who considers the interest of shareholders is likely to create wealth for the shareholders. Therefore, agency relationship attracts agency costs and agency benefits (Berk and DeMarzo, 2011; Hannah, 2007; Jensen and Meckling, 1976). Agency cost includes excessive consumption of perquisites, exerting sub optimal efforts, empire building that includes hiring relatives who are not qualified and making poor investment choices. Agency benefits would include having access to talented managers who make quality decisions that add value to the firm. The justification for an agency model depends on whether the benefits exceed the costs of the models (Dobbin and Jung, 2010).

Different capital structure and performance indicators are reported in the finance literature. However, it is important that to establish the relationship between performance and capital structure the indicators are not arbitrarily chosen (Michel, Oded and Shaked, 2014; Atkinson, Kaplan, Matsumura and Young, 2007; Kaplan, 1994). Studies do not come out clear why researchers prefer the return on assets and not return per share as a performance indicator, or long-term debt to equity and not long-term debt to total assets as a measure of capital structure (Abbadi and Abu Rub, 2012; Abu Rub, 2012; Azhagaiah and Gavoury, 2011; Margaritis and Psillak, 2010; Ebaid, 2009; Carvalho, de Mesquit and Lara, 2003).

The main objective of this study was to establish the bi-directional relationship between capital structure and financial performance of firms listed on the NSE during the period 1990-2012. This study differs from other studies conducted on the relationship between capital structure and performance in that it employed canonical correlation analysis to simultaneously predict multiple dependent variables from multiple independent variables (Hair, Anderson, Tatham and Black, 2010). The study aimed to address two issues. The first issue was to determine the best indicators of performance and capital structure, and the second issue was to use the best indicators identified to establish a bidirectional relationship between performance and capital structure. The remainder of this paper is structured as follows: Firstly, a literature study presents the theoretical foundation of the bi-directional relationship between capital structure and financial performance. Secondly, the sample, variables and methodology employed are outlined. Thirdly, the analysis is carried out, and lastly the results of the analysis and the recommendations are outlined.

2 Literature review

Capital structure theory guides managers in their choice of their firm's mix of the equity capital, and the debt capital required to maximise shareholder's wealth. However, researchers are yet to agree on the impact of debt capital on the value of the firm. The proposition that purely financial transactions do not change the total cash flows and are therefore, zero NPV investments by Modigliani and Miller's (1958) elicited opposing views. The departures imply that debt capital affects the firm value. Debt capital impacts on a firm's tax obligation, affects contracting costs, influences real investment policy and plays a disciplinary role (Diamond and He, 2011; Myers, 1977). Smith and Warner (1979) state that with risky bonds outstanding, management, acting in the stockholders' interest has incentives to design the firm's operating characteristics and financial structure in ways, which benefit stockholders to the detriment of bondholders.

There is no unanimity on capital structure theories as to which of these theories' impact capital structure decisions. It is not clear whether it is the trade-off theory or pecking order theory that explains capital structure levels (Leary and Michael, 2010; Korteweg, 2010; Lemmon and Zender 2008). In an attempt to explain the capital structure decision, Fama and French (2002) explained than in their study they identified one scar on the trade-off model (the negative relation between leverage and profitability), one deep wound on the pecking order (the large equity issues of small low-leverage growth firms), and one area of conflict (the mean reversion of leverage) on which the data speak softly. They commented that the predictions of the two models yielded positive results in their tests, but when shared predictions were confirmed, it was found that attributing causation was elusive, and as a result they could not tell whether the results were due to trade-off forces, pecking order forces, or other factors overlooked by both theories.

There are two theorist prescriptions relevant to this study, namely the use of debt capital to alleviate agency costs and subsequent improvement in performance under different investor protection environments. These issues are raised in Ellul, Guntay and Lel (2007) while Harvey, Lins and Roper (2004) study on the extent debt capital mitigates agency costs to create shareholder value. Gamba and Triantis (2014) examined the effectiveness of debt covenants in alleviating financial agency problems, and concluded that the presence of debt capital and enforcement of debt covenants significantly alters dynamic financing and investment policies, and is an important element of structural models. These prescriptions define a new role for debt, and again, presented testable propositions. Risk theory helps us differentiate shareholders from debt holders.

In a market that is in equilibrium, shareholders and debt holders are satisfied because they receive risk-adequate returns from their investment. However, if at any point in time, the assets of a corporation are not able to cover its liabilities, then the amounts realized from the assets are distributed to debt holders, in which case shareholders get nothing. However, when the company assets' values are much higher than the total amount originally invested by shareholders and debt holders, all the additional value accrues to shareholders and nothing to debt holders. First, this tells us that rational debt holders are a class of investors who are more risk averse than shareholders. Secondly, prior to lending, debt holders might not have full information about borrowers; that is, debt holders face an adverse selection problem (Mishkin, 2010). Thirdly, shareholders can adversely transfer some risk to debt holders' that is, moral hazard problem (Mishkin, 2010). The possibility of managers adopting bait and switch strategy put debt holders on the alert mode (Brigham and Daves, 2010).

Apart from credit risk, the lenders other worry is managerial actions that result into asset transformation; that is, the possibility that the borrower replaces a less risky asset with a riskier asset, as this enhances the probability of default. The asset substitution and underinvestment problem places more risk on the debt holders without providing them with additional safety and return (compensation). Again if the high-risk project fails, the firm's chances of defaulting on its debt increases to the detriment of debt holders, but if (for example, levered mergers) it succeeds, then it is shareholders not debt holders who benefit (Bernile, Lyandres and Zhdanov, 2007).

The argument that debt holders should supplement equity holders in monitoring management is based on information asymmetries, and shareholders lack of capacity to monitor management, coupled with debt holders' information and capacity advantage. However, the shortcoming with debt holders and to some extent, board of directors monitoring role is that the information they rely on is largely made available by management, who might be selective about the monitoring information supplied (Ravina and Sapienza, 2010). Intuitively, management might be reluctant releasing information to those they perceive to be criticizing their actions or directors who audit their actions.

Studies on capital structure in developing countries emphasized the use of debt, equity and retained earnings to fund business operations (Lemma and Negash, 2011; Abor and Biekpe, 2009; Abor and Biekpe, 2005; Chen, 2004). The benefits of debt capital are discussed under tax benefits and the capacity of debt holders to discipline management. Damodaran (2007) argument is that "Equity is a cushion; Debt is a sword; managements of firms which have high cash flows left over each year are more likely to be complacent and inefficient."

The research finding on effect of debt capital and financial distress on shareholder's return is mixed (Myers, 2001). Abor and Biekpe (2009) observed that empirical studies conducted on the capital structure of SMEs have tended to concentrate mainly on developed economies with varied and inconclusive results. The assertion in Abor and Biekpe (2009) that the differences in institutional arrangements and financial markets between advanced and developing countries actually merit the need to look at the issue from the perspective of developing economies, especially within the context of sub-Saharan Africa.

From a risk sharing and insurance perspective, debt capital can hedge shareholder's losses, in which case debt capital is evaluated in terms of its impact on the firm's performance. This is a shift from the neutral mutation hypothesis that implies that firms adopt habits of financing which do not impact on the value of the firm (Anderson and Carverhill, 2007; Miller, 1977). From the agency theory perspective, a conflict exists between shareholders and debt holders. Debt covenants contain restrictions on the company's activities that might compromise a manager's creativity and innovativeness necessary to add value to

the firm. Furthermore, if firms make investment and financing decisions based on their existing capital structure, then a possibility that debt capital can induce debt overhang or underinvestment problems is real (Admati, DeMarzo, Hellwig and Pfleiderer, 2012). The debt overhang or underinvestment problems can force managers to relinquish beneficial projects, thus undermining profitability, growth and survival of the firms (Allen, Bhattacharya, Rajan and Schoar, 2008). In conclusion, debt has it negative and positive sides that need to be managed and exploited, and the debt effect on firms can be determined by studying the effect of debt capital on firm performance.

Debt capital augments the probability of a distressed firm being liquidated, and that financial distress is costly if it adversely affects shareholders and managerial investment decisions, thus eroding the wealth of shareholders (Campbell, Hilscher and Szilagyi, 2008). The link between capital structure and performance is conceived by way of the direct link between financing and real investment decisions (La Rocca, La Rocca and Gerace, 2008). Debt holders just like any other investors get attracted to profitable and financially sound businesses. The testable theory predicts performance as a factor in explaining the use of debt, therefore, productive and money-making firms will use more debt (Margaritis and Psilaki, 2010). The reverse of the preceding thesis is that efficient firms may use less debt to minimise their exposure to financial risk (He and Matvos, 2012). In addition, the franchise value hypothesis suggests that the more profitable and liquid the firm is, the lower the leverage (Cheng and Tzeng, 2011; Margaritisa and Psillak, 2007; Berger and Bonaccorsi, 2006; Lai, Lin and Wen, 2005). A capital structure study in Ghana reported positive associations between debt ratio (capital structure), firm size and growth, while asset tangibility, risk, corporate tax and profitability are negatively related to the debt ratio (Abor and Biekpe, 2005).

Firm performance (efficiency hypothesis) can be influenced by the amount of debt in capital (Margaritis and Psillak, 2007; Cheng and Tzeng, 2011). Abor (2005) reported that in Ghana, profitable firms depended more on debt as their main financing option. In Brazil, the rates of return to shareholders presented a positive correlation with short-term debt and equity, and an inverse correlation with long-term debt (Carvalho, de Mesquit and Lara, 2003). In India, a study by Azhagaiah and Gavoury (2011) found a strong one-to-one relationship between capital structure variables and profitability variables, return on assets (ROA) and return on capital employed (ROCE) and that capital structure has significant influence on profitability, and increase in use of the debt capital tends to minimize the net profit. Berger and Bonaccorsi di Patti (2006) findings are that higher leverage or a lower equity capital ratio is associated with profit efficiency, while other studies hypothesise a negative relation between performance and capital structure (Chen and Zhao, 2006: Strebulaev, 2003). Welch's (2010) commented that in the theory of capital structure, one common hypothesis derives directly from the equity-sensitivity channel: a firm with more leverage has both higher-powered incentives and (usually) a higher probability of financial distress. In turn, this means that leverage can influence managerial behavior. A second common hypothesis about leverage arises from the fact that payments to creditors are excluded from corporate income tax. These two hypotheses have formed the basis of modern capital structure theory since Robichek and Myers (1966). These mixed findings need further confirmation in different economies.

Alternative indicators of capital structure and performance appropriate to research and decision making are suggested in the finance literature. Therefore, it is important that the choices of performance and capital structure indicators are explored to avoid arbitrarily or incorrigibly employing performance and capital structure indicators in research and managerial decisions (Chen 2004; Kaplan, 1994). The assumption is that from a manager's perspective, selecting the right key performance indicators and key capital structure indicators and implementing them effectively will improve a firm's performance while from a researcher's perspective correct choice lead to development of a meaningful relationship between performance and capital structure.

3 Research objectives

The primary objective of the study was to investigate the bi-directional relationship between capital structure and performance of firms listed on the NSE using data for the period 1990 to 2012.

4 Research methodology

4.1 Data collection

The population of the study consisted of all companies listed on the NSE during the period 1990 to 2012. As at 31st December 2012, sixty one (61) companies were listed on the NSE. Due to their unique capital structure, firms classified as financial institutions were left out, leaving a sample of 37 firms that translate into 851 (37x23) possible years, depending on availability of data.

The study relied on secondary data in the annual reports supplied by listed firms. Share price listings were found at NSE and Capital Markets Authority (CMA). The study employed panel data, i.e., instead of a firm being a unit of observation, firm and each firm year became an observation as was in Faleye, Hoitash and Hoitash (2011). The comfort in extracting information from annual reports is that they were subjected to an audit by reputable audit firms; while

the comfort in using market data is that such data is on public domain and is subjected to public scrutiny. However, where returns per share are to be calculated, they were adjusted for dividends paid, share splits and right issues.

4.2 Definition of variables and hypotheses

In determining the relationship between performance and leverage (capital structure), this study identified latent relationships by building composites of variables rather than the individual variables using competing indicators of capital structure and performance. This was to determine whether capital structure and performance are independent of one another. The logic of composite variables is when investors evaluate a firm to make an investment decision, they examine both income and balance sheet ratios and not just a single ratio. At the same time, investors rely on a battery of performance indicators that include accounting and market performance indicators. The relevant equations are:

$$Performance_i = \alpha_i + \beta_i CapitalStructure_i + \mathcal{E}i \quad (1)$$

Where α is a constant
β is the coefficient generated by regression
Ɛ is the error term,

and the reverse equation is:

$$Capital\ Structure_i = \alpha_i + \beta_i Performance_i + \mathcal{E}_i \quad (2)$$

Since the purpose of this study was to compute the (simultaneous) relationship between seven measures of performance with six measures of capital structure, canonical correlation was the appropriate method of analysis. Canonical correlation is a procedure for assessing the relationship between variables, and allows for the assessment of the relationship between metric independent variables and multiple dependent measures (Huang, Lee and Hsiao, 2009; Wolfgang and Samir, 2007; Tacq, 1997). The importance of and sense in the canonical correlation analysis is derived from the regression analysis. In multiple regressions, there is only one dependent variable, and a set of independent variables. In the case of canonical correlation, there is an entire set of dependent and independent variables. Therefore, canonical correlation is an attempt to find a linear combination between dependent and independent variables in such a way that the two are maximally correlated.

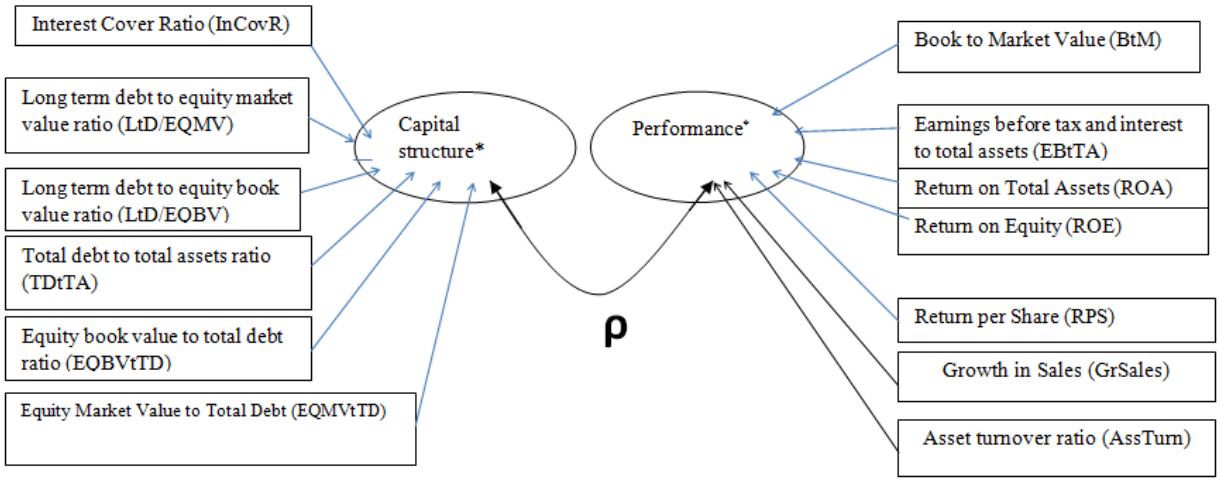
The seven performance indicators and the six capital structure indicators employed in this study are presented in Table 1.

Table 1. Summary of variables used canonical correlation analysis

Capital Structure Variables:	Measurement Level	Variable Type
Interest Cover Ratio (InCovR)	Continuous (Times)	Independent /Dependent Variable
Long term debt to equity market value ratio (LtD/EQMV)	Continuous (Times)	Independent/Dependent Variable
Long term debt to equity book value ratio (LtD/EQBV)	Continuous (Times)	Independent Variable/Dependent
Total debt to total assets ratio (TDtTA)	Continuous (Times)	Independent Variable/Dependent
Equity book value to total debt ratio (EQBVtTD)	Continuous (Times)	Independent Variable/Dependent
Equity market value to total debt ratio (EQMVtTD)	Continuous (Times)	Independent Variable/Dependent
Performance Variables:		
Book value to market value ratio (BtM)	Continuous (Times)	Independent/Dependent Variable
Earnings before tax and interest to total assets (EBtTA)	Continuous (Times)	Independent/Dependent Variable
Return on Total Assets (ROTA)	Continuous (Times)	Independent /Dependent Variable
Return on Book Value of Equity (ROE)	Continuous (Times)	Independent/ Dependent Variable
Return on Market Value of Equity (RPS)	Continuous (Times).	Independent/Dependent Variable
Growth in Sales (GrSales)	Continuous (Times)	Independent/Dependent Variable
Asset turnover ratio (AssTurn)	Continuous (Times)	Independent/Dependent Variable

The two theoretical concepts, performance and capital structure are the canonical variables; and their correlation is known as canonical correlation. The first canonical variable performance is measured by p = seven (7) indicators, from book value to the market value ratio to the asset turnover ratio, and we consider performance* a linear combination of these seven variables. The idea was to build a composite performance index consisting of seven performance indicators. In comparable mode, capital structure* which is the second canonical variable, is also a linear combination of q = six (6) indicators, interest cover – times to total debt to the total asset ratio as illustrated in Figure 1 below.

Figure 1. Casual canonical correlation - Capital structure and performance variables



Note: ρ is the canonical correlation

The set of two variables are each presented by a linear combination as follows:

$$\text{Capital Structure}^* = \alpha_1 \text{InCovR} + \alpha_2 \text{LtD/EQMV} + \alpha_3 \text{LtD/EQBV} + \alpha_4 \text{TDtTA} + \alpha_5 \text{EQBVtTD} + \alpha_6 \text{EQMVtTD} \quad (3)$$

$$\text{Performance}^* = \beta_1 \text{BtM} + \beta_2 \text{EBtTA} + \beta_3 \text{ROA} + \beta_4 \text{ROE} + \beta_5 \text{RPS} + \beta_6 \text{GrSales} + \beta_7 \text{AssTurn} \quad (4)$$

The two linear combinations (canonical variables) Capital Structure* and Performance* are unknown that is, the question of causality remain an open one, it can be performance influencing capital structure or capital structure influencing performance or both (bidirectional relationship). The parameters, α and β or weights are generated through canonical correlation analysis (Tacq, 1997). On the basis of canonical weights, we interpreted the association between capital structure and performance. The correlation between the primary variables and canonical variables (structure correlations) offers better possibilities for interpretation (Hair, Anderson, Tatham and Black, 2010). The Hypotheses for this study were defined as follows:

H_{01}: Firm performance does not have a significant effect on leverage, and alternative

H_{11}: Firm performance has a significant effect on leverage;

H_{02}: Leverage does not have a significant effect on firm performance; the alternative hypothesis being:

H_{12}: Leverage has a significant effect on firm performance.

5 Results and findings

The canonical correlations from capital structure and performance indicators are presented in Table 2. The first canonical variates and their correlation are the sample canonical correlation coefficient for the first pair of canonical variates. The residuals are then analysed to find a second pair of canonical variates whose weights are chosen to maximise the correlation between second pair of canonical variates, using only the variance remaining after the variance due to the first pair of canonical variates has been removed from the original variables. This continues until a "significance" cutoff is reached or the maximum number of pairs (which equals the smaller of m and p, in this case six (6), the number of capital structure variables) is reached (Wuensch, 2013).

Canonical correlation is Pearson's correlations of the pairs of canonical variates. The number of canonical dimensions is equal to the number of variables in the smaller set. In our case, capital structure has fewer variables (six) against performance seven variables, therefore the result is six canonical dimensions. Presented in Table 2 are eigen value of INV(E)*H, which are equal to CanRsq/(1–CanRsq), where CanRsq is the corresponding squared canonical correlation, and for each eigen value is the difference from the next eigen value, the proportion of the sum of the eigen values, and the cumulative proportion are computed.

Table 2. Canonical Correlation Analysis – Capital Structure and Performance Variables

	Canonical Correlation	Adjusted Canonical Correlation	Approximate Standard Error	Squared Canonical Correlation	Eigen values of Inv(E)*H = CanRsq/(1-CanRsq)				Test of H0: The canonical correlations in the current row and all that follow are zero				
					Eigen-value	Difference	Proportion	Cumulative	Likelihood Ratio	Approximate F Value	Num DF	Den DF	Pr > F
1	0.583528	0.566502	0.0248	0.340504	0.5163	0.0916	0.4353	0.4353	0.368168	18.45	42	3263.3	<.0001
2	0.545991	0.544825	0.0264	0.298106	0.4247	0.2389	0.3581	0.7933	0.558257	14.57	30	2786	<.0001
3	0.395833	0.388425	0.03172	0.156684	0.1858	0.1513	0.1566	0.95	0.795359	8.26	20	2312.6	<.0001
4	0.182562	.	0.03636	0.033329	0.0345	0.0137	0.0291	0.979	0.943133	3.44	12	1847	<.0001
5	0.142839	.	0.03684	0.020403	0.0208	0.0168	0.0176	0.9966	0.97565	2.89	6	1398	0.008
6	0.063478	.	0.03746	0.004029	0.004		0.0034	1	0.995971	1.42	2	700	0.243

The first canonical correlation is the greatest possible multiple correlations with the classes that can be achieved using a linear combination of the quantitative variables of performance and capital structure. The first pair of variates, a linear combination of the capital structure measurements and a linear combination of the performance measurements, has a correlation coefficient of 0.583528, almost 60 percent; and this value represents the highest possible correlation between any linear combination of capital structure measurements and performance measurements. This correlation is associated with a Wilks' Lambda of $p < 0.0001$ and therefore, statistically significant. The second pair has a correlation coefficient of 0.5459910, the third pair 0.395833, the fourth pair 0.182562, the fifth pair 0.142839 and the sixth pair 0.063478. The first canonical correlation in this case, 0.583528 are always of most interest, and normally the highest value.

5.1 Multivariate statistics and F approximations

Multivariate statistics presented in Table 3 are from the test to establish whether the canonical correlation is zero, and whether a linear relationship exists between performance and capital structure. While the six canonical correlations are presented in Table 2, the related multivariate statistics are presented in Table 3.

Table 3. Multivariate Statistics and F Approximations – Capital Structure and Performance

Multivariate Statistics and F Approximations					
S=6 M=0 N=346.5					
Statistic	Value	F Value	Num DF	Den DF	Pr > F
Wilks' Lambda	0.36816824	18.45	42	3263.3	<.0001
Pillai's Trace	0.85305588	16.57	42	4200	<.0001
Hotelling-Lawley Trace	1.18617427	19.59	42	2169	<.0001
Roy's Greatest Root	0.51631048	51.63	7	700	<.0001

Note: F Statistic for Roy's Greatest Root is an upper bound.

In Table, 3 Wilks Lambda is the product of the values of (1- canonical correlation squared) or 0.368168 and is equal to the likelihood ratio. Since the F-value is 18.45 and P-value is 0.0001, we reject the null hypothesis which states that the canonical correlations are zero. The Pillars trace multivariate statistic with an F value of 16.5 and p of 0.0001 confirm that the canonical correlations are not zero. Hotelling-Lawley trace is similar to Pillar Trace and also tests whether the canonical correlations are zero. The last statistic in Table 3 is Roy's greatest root, and because it is based on maximum values, it reports the largest Eigen values with the F-value of 51.63, and the p-value of 0.0001. Roy's greatest root rejected the hypothesis that canonical correlations are zero.

5.2 Standardised canonical coefficients for the capital structure measurements and performance measurements

The raw coefficients do not have equal variance and are not measured in the same units, therefore, are standardised to allow for a meaningful comparison and interpretation. Standardising raw coefficients require multiplying the raw coefficients with the standard deviation of the related variable (Hair, Anderson, Tatham and Black, 2010). The standardised canonical coefficients from the capital structure measurements showing how one standard deviation increases in a capital structure indicator impacted on the capital structure variate are presented in Table 4. In Table 4 for the variable equity market value to total debt (EQMVtTD), an increase of one standard deviation in this variable led to a 0.3182 increase in the first capital structure variate. For the long-term debt to equity market value (LtD_EQMV) an increase of one standard deviation in this variable led to a decrease of -0.5900 and therefore, has a suppressing effect on first capital structure variate.

Table 4. Standardised canonical coefficients for the capital structure measurements

	kCapital1	**kCapital2**	**kCapital3**	**kCapital4**	**kCapital5**	**kCapital6**
InCovR	0.0707	-0.4412	0.6175	0.4064	-0.4842	0.2454
LtD_EQMV	-0.5900	0.4645	0.5764	0.2904	0.5029	0.0538
LtD_EQBV	-0.0907	-0.1266	-0.7453	0.714	-0.287	0.0996
TDtTA	1.0158	0.2085	0.1257	0.0255	0.0682	0.8155
EQBVtTD	-0.1468	0.1542	-0.1387	-0.3343	-0.28	1.2672
EQMVtTD	0.3182	-0.6401	-0.0005	0.3175	0.8934	-0.1238

The standardised canonical coefficients for performance measurements are presented in Table 5

Table 5. Standardised Canonical Coefficients for the Performance Measurements

	Performance1	Performance2	Performance3	Performance4	Performance5	Performance6
BtM	-0.4924	0.453	0.6257	-0.1605	0.2311	-0.4747
EBtTA	-0.2571	-0.9948	0.4429	0.3753	0.3559	-0.3416
ROTA_	0.352	0.3883	0.1836	-0.7298	0.3031	0.6839
ROE	-0.0302	0.2051	0.3641	-0.4624	-0.9309	-0.1661
RPS	-0.1272	0.0781	0.1567	0.748	-0.0725	0.6804
GrSales	0.036	-0.0089	0.1237	0.0514	-0.0715	0.1435
AssTurn	0.7953	0.2929	0.3738	0.2467	-0.0001	-0.3214

A one-unit increase in one standard deviation in book value to market value would lead to a -0.4924 decrease in the first performance1 as depicted in Table 5. However, a one-unit increase in one standard deviation in the asset turnover ratio would lead to a 0.7953 increase in the first performance1. These canonical structure coefficients, measure the simple linear correlation between an original variable in the dependent or independent set and the set's canonical variate; and are interpreted as factor loading in assessing the relative contribution of each variable to each canonical function.

5.3 Canonical loading

The two canonical loadings in this study are correlations between the capital structure measurements and their canonical variables and correlations between the performance measurements and their canonical variables. The correlations between each capital structure variable and capital structure canonical variate were relied upon in concluding whether the variates are combining with the variables (indicators) in a way to represent a particular idea (See Table 6). The first variate for capital structure (kCapital1) is highly positively correlated with the total debts to the total asset ratio (TDTtA: 0.748), but moderately negatively correlated with the equity book value to the total debt ratio (EQBVtTD: -0.462). The correlation between long-term debt to equity market value (LtD_EQMV) and kCapital1 is -0.320 but uncorrelated or lowly correlated with other variables. Therefore, the first variate captures much of the shared variance between the total debt to the total asset ratio, equity book value to total debt ratio and long-term debt to equity market value.

Table 6. Correlations between the capital structure measurements and their canonical variables

	kCapital1	kCapital2	kCapital3	kCapital4	kCapital5	kCapital6
InCovR	-0.036	-0.525	0.614	0.339	-0.468	0.113
LtD_EQMV	-0.320	0.588	0.331	0.535	0.366	0.150
LtD_EQBV	-0.065	0.184	-0.529	0.811	-0.120	0.100
TDtTA	0.748	0.565	0.105	0.306	0.046	0.120
EQBVtTD	-0.462	-0.371	-0.167	-0.348	0.119	0.697
EQMVtTD	-0.062	-0.716	-0.084	0.010	0.655	0.218

The correlation for the equity market value to debt (EQMVtTD) with the second capital structure variate was -0.716; the correlation for long-term debt to equity market value (LtD_EQMV) with the second capital structure variate was 0.5880; and the correlation for the interest cover ratio (InCovR) with the second capital structure variate was -0.525. It appears that when a composite index of measures of capital structure is constructed, the dominating variable is the total debt to the total asset ratio. Therefore, the variable used to predict firm performance was the total debt to the total asset ratio.

In relation to performance measures and performance variate, the results presented in Table 7 show that the asset turnover ratio (AssTurn) of 0.8102 and book value to the market value ratio (BtM) of -0.5386 are highly correlated with the first performance variate

(Performance1). The correlation between return on total assets (ROTA) with first variate is low (0.2343), yet a number of studies use this ratio as an indicator of performance. The correlation between the second variate with the book value to the market value ratio (BtM) is 0.5654, but its correlation with earnings before tax and interest and tax to total assets is -0.7765. It emerges that BtM is a strong performance indicator. The other variables are not correlated with the variate, and this is not surprising given that a number of these variables are lowly correlated. Therefore, asset turnover ratio and book value to the market value ratio are a useful ratio in predicting the capital structure.

Table 7. Correlations between the performance measurements and their canonical variables

	Performance1	Performance2	Performance3	Performance4	Performance5	Performance6
BtM	-0.5386	0.5654	0.4469	0.0398	0.341	-0.2677
EBtTA	0.0662	-0.7765	0.5978	-0.1065	0.1111	0.0707
ROTA_	0.2343	-0.1382	0.4505	-0.5438	0.3203	0.5616
ROE	-0.0159	-0.2130	0.4399	-0.2565	-0.8215	0.0833
RPS	-0.1964	0.1866	0.3811	0.6039	-0.1878	0.5935
GrSales	-0.0130	-0.0391	0.2144	0.0194	-0.0873	0.1816
AssTurn	0.8102	0.1837	0.3385	0.3169	0.048	-0.3015

In summary, the findings confirmed that to build a meaningful relationship between firm performance and capital structure in firms listed on the NSE, researchers should employ the following variables: asset turnover ratio and book value to the market value ratio as indicators of performance, and the total debt to the total asset as an indicator of capital structure. The choice of book value to market value is based on its suppressing effect and therefore, as a control variable.

5.4 Canonical cross-loadings from capital structure and performance indicators

The canonical cross-loadings, an alternative to canonical loadings, is a procedure correlating each variable directly with the other canonical variate (Dillon and Goldstein, 1984). In this procedure, if performance variate is a response variable, then the capital structure indicators are the predictor variables. The results from the correlations between each capital structure indicator and canonical variates of performance are presented in Table 8.

Table 8. Correlations between the capital structure measurements and the canonical variables of the performance measurements

	Performance1	Performance2	Performance3	Performance4	Performance5	Performance6
InCovR	-0.0209	-0.2867	0.2428	0.0619	-0.0668	0.0072
LtD_EQMV	-0.1866	0.3208	0.1311	0.0977	0.0522	0.0095
LtD_EQBV	-0.0379	0.1006	-0.2092	0.1481	-0.0171	0.0063
TDtTA	0.4365	0.3084	0.0414	0.0559	0.0066	0.0076
EQBVtTD	-0.2695	-0.2026	-0.0661	-0.0636	0.017	0.0442
EQMVtTD	-0.0362	-0.3907	-0.0333	0.0019	0.0936	0.0139

The first variate is always the most important, in this case, Performance1 is the initial variate. The highest correlation of 0.4365 is that of total debt to the total asset ratio (TDtTA) and first performance variate (Performance1). The correlation between the equity book value to total debt (EQBVtTD) and the first performance variate (Performance1) is -0.2695, while the correlation between interest cover ratio (InCovR) and the first performance variate (Performance1) is -0.0209, and has a suppressing effect. The correlation between long-term debt to equity book value (Ltd-EQBV) and first performance variate (Performance1) is -0.0379, and the correlation between the equity market value to total debt (EQMVtTD) and first performance variate (Performance1) of -0.0362 was almost uncorrelated to first performance variate.

The correlations between the performance measurements and the canonical variables of the capital structure measurements allowed for identification of performance indicators that explained the amount of debt used by firms listed on the NSE. The correlations between each performance indicator and the opposite canonical variates of the capital structure required to identify performance indicators are as presented in Table 9. The highest reported correlation is between the asset turnover ratio (AssTurn) with the first capital structure covariate (kCapital1) of 0.4728. Therefore, the appropriate indicator to predict usage of debt (capital structure) is the asset turnover ratio.

The book value to the market value ratio has the highest correlation (0.3087) with second capital structure canonical variate. However, the correlation between the book value to the market value ratio with the first capital structure covariate was -0.3143. The book value to the market value ratio suppressed the relationship between capital structure and performance, and therefore, was used as a control variable is to validate the findings.

The dominant capital structure indicator was the total debt to the total asset ratio because it has the highest correlation with first capital variate (0.748). Therefore, to establish the relationship between performance and capital structure, the relevant indicators are: the asset turnover ratio and the book value to the market value ratio as indicators of performance, and the debt to the total asset ratio as an indicator of capital structure.

Table 9. Correlations between the performance measurements and the canonical variables of the capital structure measurements

	kCapital1	kCapital2	kCapital3	kCapital4	kCapital5	kCapital6
BtM	-0.3143	0.3087	0.1769	0.0073	0.0487	-0.017
EBtTA	0.0386	-0.424	0.2366	-0.0194	0.0159	0.0045
ROTA_	0.1367	-0.0754	0.1783	-0.0993	0.0458	0.0356
ROE	-0.0093	-0.1163	0.1741	-0.0468	-0.1173	0.0053
RPS	-0.1146	0.1019	0.1509	0.1103	-0.0268	0.0377
GrSales	-0.0076	-0.0214	0.0849	0.0035	-0.0125	0.0115
AssTurn	0.4728	0.1003	0.134	0.0579	0.0069	-0.0191

5.5 Canonical Redundancy Analysis

Redundancy analysis captured the percentage of variance accounted for from the two sets of variables, capital structure and performance. Therefore, canonical redundancy analysis was conducted to determine standardised variances of the dependent and independent variables that were explained by their own or the opposite canonical variate. The results of canonical redundancy-capital structure and canonical redundancy-performance measurement are presented in Tables 10 and Table 11 respectively.

Table 10. Canonical Redundancy - Capital Structure Measurements

Raw Variance of the Capital Structure Measurements Explained by					
Canonical Variable Number	Their Own Canonical Variables		Canonical R-Square	The Opposite Canonical Variables	
	Proportion	Cumulative Proportion		Proportion	Cumulative Proportion
1	0.0192	0.0192	0.3405	0.0065	0.0065
2	0.3334	0.3525	0.2981	0.0994	0.1059
3	0.2406	0.5932	0.1567	0.0377	0.1436
4	0.0851	0.6783	0.0333	0.0028	0.1464
5	0.2627	0.941	0.0204	0.0054	0.1518
6	0.059	1	0.004	0.0002	0.152

Table 11. Canonical Redundancy - Performance Measurements

Raw Variance of the Performance Measurements Explained by					
Canonical Variable Number	Their Own Canonical Variables		Canonical R-Square	The Opposite Canonical Variables	
	Proportion	Cumulative Proportion		Proportion	Cumulative Proportion
1	0.2683	0.2683	0.3405	0.0913	0.0913
2	0.2514	0.5197	0.2981	0.075	0.1663
3	0.1842	0.7039	0.1567	0.0289	0.1952
4	0.0575	0.7614	0.0333	0.0019	0.1971
5	0.104	0.8654	0.0204	0.0021	0.1992
6	0.1088	0.9742	0.004	0.0004	0.1996

Redundancy analysis indicates how much of the average of proportion of variance among the variables of one set may be predicted from the variables from the other set. High redundancy suggests the ability of independent variable to predict the dependent variable. The first and the second canonical covariate for the group explained 1.92 percent and 33.34 percent respectively of variability in capital structure variables, while canonical covariate for the group explained 0.065 percent and 0.994 percent of the opposite canonical variate (see Table 10). The first and the second canonical variate explained 26.83 percent and 25.14 percent respectively of the variability in the performance variables (see Table 11).

In the case of capital structure measurements, though the first canonical variate for the capital structure explained 0.065 percent of the variability in performance measurements, the cumulative variability explained by all the six canonical variates was 15.2 percent (see Table 10). In case of performance measurements, though the first canonical variate explained 9.13 percent of the variability in capital structure, the cumulative variability explained by all the six canonical variates was 19.96 percent (see Table 11). The data tell us that the degree of the influence of

performance on capital structure is higher than the degree of influence of capital structure on performance.

5.6 Validation and diagnosis of findings

The last stage involved a validation of the canonical correlation analyses by splitting the sample into estimation and validation samples and the findings between the two samples, no varying result was found between the samples. The detailed analysis was therefore not reported. The next step of validation was to use the average for each variable in each company in the canonical correlation analysis, and the results were not different from the ones reported.

6 Summary and conclusion

Different capital structure and performance indicators are reported in the finance literature. However, it is important that in order to establish the relationship between performance and capital structure, the indicators are not arbitrarily chosen (Michel, Oded and Shaked, 2014; Atkinson, Kaplan, Matsumura and Young, 2007; Kaplan, 1994). Studies do not come out clear why researchers prefer accounting-based measures, namely ROE and ROA as measures of performance. The main objective of this study is to establish the bi-directional relationship between capital structure and financial performance of firms listed on the NSE during the period 1990 to 2012. The study used canonical correlation analysis to establish a bidirectional relationship between capital structure and performance, and to identify the relevant indicators of capital structure and performance.

The result of canonical analysis showed that the dominant capital structure indicator to be used to predict performance is total debt to the total asset ratio. In the case of performance, the two variables that relate to capital structure are book value to market value ratio and asset turnover ratio. Though the canonical analysis showed substantial relationships of conceptual and practical significance, further analysis involving measures other than canonical correlation (for example, regression analysis) are recommended to determine the amount of the capital structure variable variance accounted for or shared with the performance variables and vice versa.

The emergence of book value to market value ratio and asset turnover ratio as indicators of performance is a challenge to studies that employ other indicators of performance such as return on assets (ROA). Intuitively the tentative finding that market to book value is negatively correlated to amount of debt employed by the firm suggest that investors who think debt adds value to a firm might demand more shares of a firm that have just issued debt, thereby pushing the market price of a share up while the book value remained unchanged. The data in this study supported the hypothesis that efficient and profitable firms use more debt (Margaritis and Psilaki, 2010). The hypothesis that capital structure influence firm performance was marginally supported by the data, and this found support in the arguments advanced by Cheng and Tzeng (2011) and Margaritis and Psillak (2007; 2010).

In conclusion it should be noted that capital structure and performance are not independent of one another and that first, the null hypothesis that firm performance does not have effect on leverage is rejected, and second the null hypothesis that leverage does not have effect on firm performance is also rejected. The data supports the conclusion that a bi-directional relationship between capital structure and debt capital exists. However, the degree of the influence of performance on capital structure is more pronounced than the degree of influence of capital structure on performance.

7 Limitations of the study

The first limitation of this study is that data was limited to non-financial firms listed on the NSE for the period 1990 to 2012, inclusion of financial firms would allow for generalisation of the findings. The second limitation is that though a bi-directional relationship between capital structure and performance is confirmed by the data, it failed to tell us whether performance is informed by level of leverage or if leverage is informed by level of performance. It is suggested that the generalised linear model (GLM) procedure be used to examine the relationship between capital structure and performance by taking into account the levels of performance and level of leverage.

8 Managerial implication and recommendations

The analysis provides insights into the structure of the different variable sets (capital structure and performance) as they relate to dependence in relationship, this is of practical and conceptual significance and opens a window for further studies. Management in firms should therefore take cognizance of the fact that asset turnover ratio best relate positively to borrowing levels, and that performance and capital structure are important concepts in managing firms. In addition, book value to market value has a suppressing effect on the level of borrowing. The message to researchers is that future studies into the relationship between capital structure, and performance should be based on their choice of a representative measure of performance and a representative measure of capital structure by applying canonical correlation. This is because the choice of variables is contingent on the data set employed.

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