Is Capital Structure Associated with Working Capital? Empirical Evidence from Nigeria

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ABSTRACT

This paper investigates the association between capital structure and elements of working capital, using ratios. The paper hypothesizes a significant association between capital structure and a set of elements of working capital. The research data were collected from online financial statements of 89 non-finance companies listed and trading on the Nigerian Stock Exchange in 2015. The data were analyzed using one-way multivariate analysis of variance, MANOVA. We find evidence that suggests a significant association between capital structure ratio and current ratio, quick ratio, cash ratio, accounts receivable days, and inventory days.

Based on our findings, we recommend that managers should take a cue from the capital structure of their companies to manage elements of working capital. The implication of our finding is that managers may apply conservative working capital management strategies or policies.

Keywords: Capital structure, working capital, current ratio, quick ratio, cash ratio, accounts payable days, accounts receivable days, inventory turnover days, long-term debts

JEL CODES: G1, G2, G14, G19, D5, M14

I.   INTRODUCTION

Despite that capital structure matters in the life of companies (Modigliani & Miller, 1958; Grossman & Hart, 1982; Stulz, 2000; Singh, 2012), it appears that prior literature has not investigated the association between capital structure and elements of working capital. This paper examines the association between capital structure and a set of

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elements of working capital, using ratios. The paper proposes that capital structure of companies drives how managers juxtapose elements of working capital. For example, as a part of its working capital management policy a company may adopt accounting practices that can be dic²hotomized either as aggressive or conservative. Conservatism is defined as timely recognition of bad news compared to delayed recognition of good news (Basu, 1997).Whereas aggressive accounting is associated with short-term financing strategy, conservative accounting is associated with long-term financing strategy. An aggressive (a conservative) working capital management policy entails high (low) risk and high (low) return because of using short-term (long-term) funds to finance short-term needs.

Aggressive working capital management policy may lead to over-trading, which occurs when firms become overly-ambitious by trying to do too much within too short a time with little amount of long-term capital. Aggressive firms can be making profits yet have liquidity problems that could endanger their activities. This can lead to insolvency and impair companies' financial viability. Over-capitalization is associated with a conservative working capital management strategy. Over-capitalization is whereby a company accumulates excessive inventory, account receivables and cash but the company merely has account payables to the extent that there is over-investment in current assets. As total current assets far outstrip total current liabilities the company becomes over-capitalized, so that profit is lower than expected because long-term funds that could have more profitably been invested elsewhere have unnecessarily been tied up. To avoid overtrading or overcapitalization, a firm needs to optimize the use of working capital items.

The question we attempt to address in this study is: "Is capital structure associated with working capital items?" Drawing upon corporate finance, we operate on the premises that capital structure can be associated with firms' working capital posturing/maneuvers. The paper's working thesis is that companies' capital/financial structure can affect their working capital practices. That is to say that capital structure can be associated with working capital items. Specifically, we hypothesize that, on average, there is a significant association between capital structure and working capital items. The main objective of this paper, therefore, is to investigate whether there is significant association between capital structure and working capital items, using working capital ratios and capital structure ratios. *Apriori*, we expected significant association between capital structure and a set of related elements of working capital ratios. Data on 89 non-financial companies listed and trading on the Nigerian Stock Exchange were analyzed through one-way multivariate analysis of variance, MANOVA. The paper documents evidence of a significant association between capital structure ratio and current ratio, quick ratio, cash ratio, accounts receivable days, and inventory days; but not with accounts payable days. This finding suggests that capital structure is significantly associated with elements of working capital. The implication

of the finding is that managers can decide to apply conservative working capital management strategies/policies.

The paper recommends that managers should take a cue from the capital/financial structure of their firms to manage elements of working capital. In other words, it is recommended that managers should follow their companies' capital structure, which is long-term in nature, to manage elements of working capital.

In several respects, this paper makes important contributions and introduces novelties to the literature on working capital management. First, while prior papers e.g., Moosa & Sbeti, 2012; Akinlo, 2011 examine the impact of some hypothesized variables such as sales growth, tangibility, liquidity, profitability, size and GDP growth on capital structure, and thereby specify capital structure as their dependent variable, this paper specifies capital structure as independent variable.[3] Second, with particular emphasis on modeling, whereas prior papers use regression model as their model specifications, the present paper uses one-way multivariate analysis of variance.

The rest of the paper proceeds as follows: Section II provides a review of related literature, section III addresses data and methodology. Section IV presents empirical results while section V concludes the paper.

II.   LITERATURE REVIEW

A comprehensive review of capital/financial structure literature is beyond the scope of this paper. Capital/financial structure can be defined in either of two ways. One broad interpretation is that capital structure is a financial mix that consists mainly of shareholders' equity and long-term debts (see Modigliani & Miller, 1958). The other (but narrower) definition is that capital structure consists only of elements of long-term financing such as share capital and long-term debts. Modigliani & Miller (1958), Jensen & Meckling (1976), Grossman & Hart (1982), Stulz (2000) and Singh (2012) argue that capital structure matters in the running of companies. In particular, Modigliani & Miller (1958) investigate and find that total value of firms depends on firms' capital structure. In a counterbalance, Modigliani & Miller (1958) find that under certain assumptions total value is independent of financial structure. Jensen & Meckling (1976) argue that capital structure has an impact on companies' profitability. The authors demonstrate that firms' capital structure mix can alter the behavior of managers in taking operating decisions. Grossman & Hart (1982) argue that capital structure can motivate managers to use organizational *resources* (emphasis not in original) efficiently. In this paper, we interpret *resources* to embrace current assets portion of elements of working capital. In spite of the argument that capital/ financial structure matters in the life of a company, it appears that extant literature has hitherto failed to investigate the

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[3] See Akinlo (2011) for a review of some of the literatures concerning independent variables.

association between capital/financial structure and a set of elements of working capital. The purpose of our study, therefore, is to fill the gap in existing literature.

The importance of working capital cannot be overemphasized because it is a major determinant of liquidity, solvency, and survival. Working capital is the life-blood of most meaningful organizations, whether they are for-profit or not-for profit entities. According to Kargar & Bluementhal (1994), if working capital management is not given due considerations then companies may fail and go bankrupt. The set of elements of working capital including liquidity, acid-test, cash, account receivables, accounts parables and inventory play a vital role in the life of any company. In the following paragraphs, the elements of working capital ratios are examined briefly, beginning with current or liquidity ratio.

In the meanwhile, we define ratio analysis as the use of numbers in financial statements (especially income statements and statements of financial position) whereby one number is expressed over another, and calculating a measure and interpreting the measure in order to make a meaning of the relationship between the two numbers.

Current ratio measures the relation between current assets and current liabilities. Current ratio indicates the ability of a company to settle its current obligations from current assets. Quick ratio is a more penetrating ratio than current ratio. Quick ratio measures the ability to settle short-term obligations with current assets without inventory.

Cash ratio belongs to the family of liquidity ratios. Cash ratio signals the ability of a company to settle current liabilities balance with most liquid assets. Prior papers (Minton & Schrand, 1999; Singh, 2012) argue that capital structure impacts cash. Minton & Schrand (1999) argue that when the financial structure of a company is not sound, the cash flow on capital investment or R&D investment is under the industry average. Singh (2012) argues that capital structure affects cash flows of companies. A high value of current, quick or cash ratio is an indication that a company is holding too much current assets in relation to current liabilities.

Accounts receivable days are used to estimate the average number of days in a year that it takes a company to collect its money from credit customers. The longer (shorter) accounts receivable days, the more delay (the faster) it takes the company to collect trade debts from its credit customers. Furthermore, the longer the account receivable days, the more the company will need to invest in current assets such as cash, or engage in other forms of short-term financing such as bank overdraft.

Accounts payable days are used to estimate the average number of days in a year that it takes a company to settle or pay suppliers from whom it has bought goods on credit. The longer (shorter) the accounts payable days, the more delay (the faster) it takes the company to settle or pay trade suppliers. Inventory turnover days are used to estimate the average number of days in a year that inventories stay in store before they are sold or issued out. High inventory days indicate that stocks are held in store for long time, which means that it takes a long time to sell stocks.

In view of the forgoing, this paper hypothesizes a significant positive association between capital structure and elements of working capital ratios.

III.   DATA AND METHODOLOGY

Data for the study is collected from online financial statements of eighty-nine non-financial services companies that are quoted on the Nigerian Stock Exchange (NSE) as at 2015. From the companies' statements of financial position of 2015, we collected data on equity, total assets, long-term debts, and working capital items while we collected data on turnover (or sales) and cost of goods sold from the companies' income statements/statements of comprehensive income of 2015. As a requirement, all listed companies in Nigeria are obliged to file their end-of-year financial statements with the NSE. Having visited the NSE website where Nigerian companies are listed, availability of data restricts the sample size to 89. The 89 non-financial services companies were used because their 2015 year-end complete financial statements are available on the NSE's website at www.nse.ng. We exclude financial services companies because their capital structure is highly regulated, especially in view of capital adequacy, Basle accords, and more stringent regulation of banks in Nigeria. However, we note that the sample size used by the present paper compares well with those used by prior Nigerian papers (e.g., Asien (2015), who used 83 firms in his study, so far one of the highest sample sizes on Nigerian studies).

Model formulation
In this study, a one-way multivariate analysis of variance (one-way MANOVA) model is specified to run the tests. The idea for using one-way MANOVA is that a company's capital structure, which is the only dependent variable, can be associated with the set of working capital items, which are the dependent variables. Use of multivariate analysis of variance (MANOVA) as the statistical method of analysis in this paper is consistent with existing theory and practice. In theory, according to Hair et al. (2009), Tabachnick & Fidel (2007), and Pallant (2007), MANOVA is the most appropriate statistical method to use where there are multiple dependent variables and one (or more) independent variable(s). In practice, Zabihollah et al. (1996) use MANOVA to simultaneously model the relationship between six independent variables and five dependent variables. In the equation below, our set of working capital items are specified as the dependent variables, and capital structure as the independent variable. In specific terms for the current paper, the one-way MANOVA equation is given as:

$$Y1\left(\frac{CA}{CL}\right), Y2\left(\frac{CA-Inv}{CL}\right), Y3\left(\frac{Cash+Cash\ equivalents}{CL}\right), Y4\left(\frac{Payables}{Purchases}\right)*365,$$
$$Y5\left(\frac{Receivables}{Sales}\right)*365, Y6\left(\frac{Avrg\ Inv}{COGS}\right)*365 = Capital\ Structure$$

Where: $\frac{CA}{CL}$ is current ratio; measuring number of times companies are able to pay off their current liabilities (*CL*) with their current assets (*CA*). $\frac{CA-Inv}{CL}$ is quick (acid-test) ratio. It measures the same thing as current ratio except that it is a more penetrating measure of liquidity than the current ratio because closing inventory (which may be very problematic to convert to liquidity) are excluded from total current assets. *Inv* = closing inventory. $\frac{Cash}{CL}$ is cash ratio, measuring the ability of companies to pay off their current liabilities with their most liquid assets, cash. Cash includes cash on hand and positive bank balances and other short-term marketable securities. $\left(\frac{TradePayables}{Purchases}\right) x\ 365$ is account payables days; which is measured in this paper as trade payables to actual total purchases. *Purchases* is year-end actual purchases; *Payables* is year-end trade account payables; $\left(\frac{TradeReceivables}{Sales}\right) x\ 365$ is account receivables days. *Trade receivables* is year-end account receivables. *Sales* is year-end sales/revenues/turnover. *COGS* is year-end cost of goods sold. $\frac{AvrgInv}{COGS} x 365$ is average inventory days. *Avrg Inv* is the average of beginning inventory and closing inventory. Three hundred and sixty-five is the number of days in a calendar year. $\frac{E}{E+D}$ is equity component of capital structure. That is, owners' equity in relation to owners' equity plus total long-term debts (*D*) including long-term borrowings/loans, bonds, debentures. *E* is shareholders' equity. We exclude retained earnings and extra-ordinary items such as foreign currency translation reserves in our definition of shareholders' equity. Owners' equity is used as numerator in capital structure rather than total long-term debts because it is rare to find any listed company that does not have owners' equity, debts or borrowings may not be employed at all in capital structure of some companies[4].

We note that the one-way MANOVA model used in this paper does not imply any causality. It is rather reflecting the association between the IV and DVs. We also note that all the variables in the model are motivated by prior literatures (see for example, Lin et al.(2011), Coyne et al. (2012)).The use of capital structure as independent variable in this study is motivated by prior literature such as Modigliani & Miller (1958), Jensen &Meckling (1976), Stulz (2000), Singh(2012), amongst others. As mentioned above, Grossman & Hart (1982) argue that capital structure can motivate managers to use organizational resources efficiently.

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[4] The findings are statistically and quantitatively similar when we alternated our equation with total long-term debt-to-total long-term debts plus shareholders' equity ($\frac{D}{E+D}$) in our MANOVA run that produced the Tests of Between-Subjects Effects of Table 5 in section IV.

IV.   EMPIRICAL RESULTS

In this section, we present the result of the paper. The descriptive statistics of the variables are presented in Table 1.

Table 1.
Descriptive Statistics

	Min	Max	Mean	Std. Dev	Kurtosis	
					Statistic	Std. Error
Equity to Capital Structure (₦'000)	.10	1.00	.7842	.26484	-.578	.506
Current Ratio(₦'000)	.03	15.51	1.5798	2.01948	30.955	.506
Quick Ratio(₦'000)	.03	7.66	1.0304	1.13085	15.591	.506
Cash Ratio(₦'000)	.00	5.37	.2905	.61420	54.390	.506
Ln Accounts payable days	2.09	15.39	9.3448	2.16265	2.195	.506
Ln Accounts receivable days	-2.36	13.14	7.9493	2.35176	5.926	.506
Ln Inventory turnover days	-.42	12.59	7.4372	2.19664	1.730	.506

Minimum (maximum) equity-to-capital structure ratio is .10 (1) whereas the mean is .7842. This shows that, on average, Nigerian companies are financed mostly by equities. Minimum (maximum) current ratio is .03 (15.51), with an average of1.5798. This shows that the companies have low current ratios on average. Minimum (maximum) quick ratio is .03(7.66), with 1.03 as the average. This further shows that the companies have low quick ratios. Minimum (maximum) cash ratio is .00(5.37), with an average of .2905. This implies that the companies have low cash ratio. The lowest (highest) accounts payable days are approximately 2(15) days, respectively. Average accounts payable days are approximately 9 days. The lowest (highest) accounts receivable days is approximately -2(13) days. Average accounts receivable days are approximately 8 days. This means that the companies are late in collecting their credit sales by 8 days. The lowest (highest) inventory turnover days is approximately -.42(13) days, with an average accounts payable days of approximately 7 days. Using average figures, the working capital cycle is about 6 (8 + 7 – 9) days, which is inventory turnover days plus accounts receivable days *less* accounts payable days.

Univariate correlation analysis
Pearson univariate correlations between/among the research variables are presented in Table 2. The strength of correlations between capital structure ratio and working capital items are from low to medium as shown in the first column of the table. There is low positive but insignificant correlation (.023, .077, and .108)between capital structure ratio and current ratio, quick ratio,

and accounts receivable days; respectively. This implies that capital structure moves in the same positive direction with current ratio, quick ratio, and accounts receivable days. There is negative insignificant correlation (-.006) between capital structure ratio and cash ratio. This implies that capital structure and cash ratio moves in the opposite direction.

Table 2.
Pearson correlation matrix

	Capital Structure	Current Ratio	Quick Ratio	Cash Ratio	Ln Accounts payable days	Ln Accounts receivables days
Current Ratio	.023 .829					
Quick Ratio	.077 .475	.866* .000				
Cash Ratio	-.006 .955	.719* .000	.482* .000			
Ln Accounts payable days	.201 .059	.070 .512	.020 .849	-.045 .674		
Ln Accounts receivable days	.108 .313	.114 .286	.077 .472	.050 .645	.258** .015	
Ln Inventory turnover days	.237** .025	.094 .379	.103 .336	.044 .680	.293* .005	.071 .508

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

There is moderate positive correlation (.201 and .237) between capital structure ratio and accounts payable days, and inventory days; respectively. The correlations among the dependent variables are positive and high in most cases. There appears to be strong significant correlation (.866) between current ratio and quick ratio, strong significant correlation (.719) between current ratio and cash ratio, moderate significant correlation (.482) between quick ratio and cash ratio. The result of these correlations are expected because related items are used in calculating the working capital items ratios. Also, the ratios are also scaled by current liabilities. There is moderate significant correlation (.258) between accounts payable days and accounts receivable days. The correlation between accounts payable days and accounts receivable days is spurious because both items are calculated with unrelated items. There is moderate significant correlation (.293) between accounts payable days and inventory turnover days. There is low positive but insignificant correlation (.071) between accounts receivables days and inventory turnover days.

Multi-collinearity check
Multi-collinearity check indicates that none of the variable inflation factors (VIF) is up to 10. The highest VIF is 7.983which is on current ratio. VIF collinearity statistics on the individual variables are not tabulated due to space constraint. Hair et al. (2009) suggests that multi-collinearity is a problem when VIF on any variable is greater than 10. To the extent that multi-collinearity problem has been addressed we now proceed with the multivariate model of one-

way MANOVA to test the association between capital structure and elements of working capital ratios.

Multivariate tests

It is not advisable to draw conclusions on the relationship between capital structure and elements of working capital based on univariate correlations alone. To test the research hypothesis, we proceed to conduct multivariate tests. First, all the multivariate test statistics shown in Table 3 are significant, which suggests, *prima facie,* that there is statistical significant difference between capital structure and elements of working capital.

Table 3.
Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Pillai's trace	4.261	1.618	318.000	210.000	.000	.710
Wilks' lambda	.000	2.641	318.000	188.089	.000	.815
Hotelling's trace	50.260	4.478	318.000	170.000	.000	.893
Roy's largest root	27.745	18.322[a]	53.000	35.000	.000	.965

Each F tests the multivariate effect of Equity-to-Equity and Long-Term Debts. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

[a.] The statistic is an upper bound on F that yields a lower bound on the significance level.

Levene's homogeneity test of equality of error variances indicates that the assumption of equality of variance is not violated. As one can see in Table 4, all the Sig. ρ.-values are higher than .05.

Table 4.

Levene's Test of Equality of Error Variances[a]

	F	df1	df2	Sig.
Current Ratio	.601	53	35	.954
Quick (Acid Test) Ratio	.947	53	35	.579
Cash-to-Current Liabilities	.363	53	35	1.000
Ln Accounts Payables days	.370	53	35	.999
Ln Accounts Receivables days	.456	53	35	.995
Ln Inventory days	1.055	53	35	.440

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

[a.] Design: Intercept + Equity-to-Equity plus Total Long-Term Debts

Hypothesis Testing

To test the paper's set of alternative form hypotheses that there is a significant positive association between capital structure and elements of working capital, tests of between-subjects effects are conducted, and presented in Table 5. As we can see from Table 5, between-subjects effects one-way

MANOVA tests are significant for all the elements of working capital used in the study, except for accounts payable days. At conventional levels, the test results indicate there is a significant association between capital structure ratio and current ratio, quick ratio, cash ratio, accounts receivables days, and inventory turnover days. The test on accounts payable days is not significant, Sig. ρ-value = .908 (2-tailed), which suggests lack of association.

Table 5.
Tests of Between-Subjects Effects

Source	Dependent Variables	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	Current Ratio	343.515[a]	53	6.481	14.753	*.000*
	Quick Ratio	102.482[b]	53	1.934	6.731	*.000*
	Cash Ratio	27.986[c]	53	.528	3.546	*.000*
	Ln Accounts payable days	207.230[d]	53	3.910	.670	*.908*
	Ln Accounts receivable days	374.243[e]	53	7.061	2.197	*.008*
	Ln Inventory turnover days	325.467[f]	53	6.141	2.168	*.009*
Intercept	Current Ratio	168.897	1	168.897	384.438	.000
	Quick Ratio	68.812	1	68.812	239.535	.000
	Cash Ratio	4.205	1	4.205	28.242	.000
	Ln Accounts payable days	4660.225	1	4660.225	798.184	.000
	Ln Accounts receivable days	3524.724	1	3524.724	1096.918	.000
	Ln Inventory turnover days	2873.763	1	2873.763	1014.403	.000
Equity-to-Equity plus Total Long-Term Debts	Current Ratio	343.515	53	6.481	14.753	*.000*
	Quick Ratio	102.482	53	1.934	6.731	*.000*
	Cash Ratio	27.986	53	.528	3.546	*.000*
	Ln Accounts payable days	207.230	53	3.910	.670	*.908*
	Ln Accounts receivable days	374.243	53	7.061	2.197	*.008*
	Ln Inventory turnover days	325.467	53	6.141	2.168	*.009*
Error	Current Ratio	15.377	35	.439		
	Quick Ratio	10.055	35	.287		
	Cash Ratio	5.212	35	.149		
	Ln Accounts payable days	204.349	35	5.839		
	Ln Accounts receivable days	112.465	35	3.213		
	Ln Inventory turnover days	99.154	35	2.833		
Total	Current Ratio	581.026	89			
	Quick Ratio	207.031	89			
	Cash Ratio	40.710	89			
	Ln Accounts payable days	8183.556	89			
	Ln Accounts receivable days	6110.699	89			
	Ln Inventory turnover days	5347.416	89			
Corrected Total	Current Ratio	358.892	88			
	Quick Ratio	112.537	88			
	Cash Ratio	33.197	88			
	Ln Accounts payable days	411.579	88			
	Ln Accounts receivable days	486.708	88			

Ln Inventory turnover days	424.620	88

a. R Squared = .957 (Adjusted R Squared = .892)
b. R Squared = .911 (Adjusted R Squared = .775)
c. R Squared = .843 (Adjusted R Squared = .605)
d. R Squared = .504 (Adjusted R Squared = -.248)
e. R Squared = .769 (Adjusted R Squared = .419)
f. R Squared = .766 (Adjusted R Squared = .413)

Although in a different setting and context, our finding is consistent with Afza & Nazir (2009), who studied the relationship between WCM practices and firms' profitability and found a strong positive association between low profitability and aggressive WCM. Following the result of their finding, Afza & Nazir (2009) recommended a conservative approach towards WCM and related financing policies.

V. CONCLUSION

It appears that the literature has failed to investigate the association between capital structure and elements of working capital. The purpose of this study, therefore, is to fill the gap in existing literature by proceeding to empirically examine the association between capital structure and elements of working capital, using ratios. One-way between groups multivariate analysis of variance (one-way MANOVA) is conducted to examine capital structure differences in the elements of working capital. We find evidence to suggest that capital/financial structure is significantly associated with elements of working capital including current ratio, quick ratio, cash ratio, accounts receivables days, and inventory turnover days. The finding suggests that firms' capital structure can be associated with firms' working capital posturing/maneuvers. This is interpreted to suggest that capital structure can be associated with working capital items. In effect, it suggests that capital structure drives how managers juxtapose elements of working capital.

Recommendations
Based on the finding of this study, we recommend that managers should take a cue from the capital/financial structure of their companies to manage firms' working capital items. In other words, we recommend that managers should follow their companies' capital structure, which is long-term in nature, when managing elements of working capital. The implication of our finding is that managers may employ/apply conservative working capital management strategies/policies.

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