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Working Capital Management and Financing Decision: Synergetic Effect on Corporate Profitability

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Persuaded by the pecking order assumptions, where internal fund is preferred over debt and equity when financing investment projects, this study provided empirical evidence on the interaction between working capital management and corporate debt structure, and the effect of this on corporate profitability. The assumption on which the study was based is that, if internal funds become the preferred source of finance for investment projects, then working capital composition is interfered, making both decisions co-dependent. A pool of time-series and cross-sectional dataset was constructed from the annual audited financial results of 35 manufacturing companies listed on the Nigerian stock exchange for a two-year period (2011 - 2012). Panel exploration and Factorial-ANOVA estimation techniques were used to estimate the econometric models developed for the study. The results suggested a significant negative relationship between firm's working capital composition and their debt structure choice. Additionally, on individual basis, the study found a positive significant relationship between debt structure and profitability but no significant relationship between firm's working capital composition and profitability. The results, however, showed that as the firm's working capital composition synchronously interacts with the debt structure, corporate profitability is positively affected. The study therefore recommends that, for firms to optimize profitability and to maintain good liquidity position, corporate financing decision should be considered side by side with their working capital composition.

Keywords: Pecking-order assumptions, working capital composition, debt structure choice, profitability

JEL: O16, E22, G32

Recently, the continuing search for strategies to reenergize or revive corporate entities after the global economic slump in 2008 has been pervasive. Most firms have sought different bailout strategies to cushion the effects of this gloomy economic cataclysm on their performance and survival. Majorly, significant efforts to recuperate ailing and liquidating companies have centered on capital restructuring. To be specific, the debt–equity synthesis and working capital management have been the center of consideration for most firms (Nwankwo and Osho, 2010). These twin–financing strategies as noted by Lazaridis and Tryfonidis (2006) are two areas widely revisited by academia in order to hypothesize corporate profitability. However, in most corporate finance literature and in empirical researches, working capital management and corporate financing decision are discussed as separate financial

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strategies, a treatment which undoubtedly relegates possible synergetic effects on corporate profitability.

Mukhopadhyay (2004) suggests that the working capital management of corporate entities is most crucial in attaining optimal liquidity position and in ensuring corporate going concern. It is one of the most important decisions for companies when making a trade-off between liquidity and profitability, perhaps, in a way that optimizes the amount and composition of their current assets and how they are financed (Eljelly, 2004). Besides, to be operationally efficient, every organization requires necessary amount of working capital irrespective of their size, or nature of business operation, whether profit oriented or not. The way a firm manages its working capital could significantly affect its profitability (Deloof, 2003; Raheman and Nasr, 2007).

Following the logic of the pecking-order assumptions (Donaldson, 1961), a firm's working capital decision usually would interpolate with its financing decisions. To agree with Donaldson, a firm's financing decision is usually assumed to follow a well-defined order, with internal funds (retained earnings) first, followed by external borrowings and then issuing of new equities (Myers, 1984; Sankay, Adekoya and Adeyeye, 2013). This assuredly, would leave the firm in a contest for its available internal funds, perhaps, either to plough it into financing long-term investment projects, or to attain optimality in its working capital composition. This has been the bottleneck for firms seeking to achieve the desired trade-off position between liquidity and profitability (Raheman and Nasr, 2007). Hence, to attain a synergetic position between these twin but distinct financial objectives, a strategic synchronism of both pursuits becomes apparent.

Hitherto, the interplay between these two financing objectives has been a concern of significant interest in the corporate circle. Recent observations by Adeyemi and Oboh (2011) have shown that most firms in Nigeria would rarely utilize long-term debt in financing investment projects, rather, earnings are usually ploughed and dividends are paid as script issues (Sankay *et al.*, 2013). This therefore, would stall the possibility of an optimal working capital position since most firms are assumed to adhere to the pecking-order predictions, whereby, firms would rather invest internal funds in long-term investment projects than seek to maintain an efficient working capital position. It is on this ground that the trade-off between profitability and liquidity remains contestable among economic experts and scholars.

This study is therefore aimed at exploring the effect of the synergy of an effective working capital composition and financing decision on corporate profitability in Nigeria. Specifically, the following objectives have been set out:

i. to investigate the relationship that exists between corporate working capital and debt ratios in firms listed on the Nigerian Stock Exchange;

ii. to examine the individual effects of the debt ratios on corporate profitability;

iii. to examine the individual effects of working capital composition on profitability;

iv. to estimate the synergetic effect of the debt ratios and working capital on corporate profitability.

By achieving these objectives, this study extends empirical work on the working capital management in two significant ways. First, it expounds the range of theoretical perspectives on corporate working capital optimization in emerging economy. Observations have shown that only minimal research efforts have been devoted into this aspect in third world nations (Oboh, Isa and Adekoya, 2012). Secondly, different from prior studies, this study applied a panel analytical tool and a Factorial-ANOVA technique to estimate the synergetic effect of an efficient working capital composition and financing decision on corporate profitability.

The remaining sections of the paper are arranged as follows: the next section presents the literature review, theoretical framework and hypotheses development; followed by the methodology adopted for the study in section III; the results and discussions are presented in section IV; and the conclusion emanating from the study constitutes the final section.

LITERATURE REVIEW

Aroused by an old-fashioned pecking-order framework, in which a firm prefers internal to external financing and debt to equity if it issues securities (Donaldson, 1961; Myers, 1984), a fierce debate among economic experts and accounting scholars on the dynamics of firm's financial structure, perhaps, on the interplay between a firm's working capital composition and its financing decision in adherence to the pecking-order predictions remains inconclusive. No doubt, because of this debatable line of thought among scholars, the pursuit for an optimal working capital composition for most firms has remained vague. However, most scholars still insist on an equilibrate trade-off position between liquidity and profitability for firms to optimize returns and minimize risks (Raheman and Nasr, 2007). This study argues that this is only true, when these firms defile some of the strict edicts of the pecking-order hypothesis. For as long as internal funds are reinvested to undertake long-term investment projects, optimizing working capital would only be an aberration for most firms.

Working Capital Composition and the Pecking Order Theory

The Donaldson (1961) pecking-order hypothesis, despite its contradictions to the Modigliani and Miller paradigm (1958) on corporate financing decision, has thrived among the most influential theories on corporate leverage gaining a wide range of acceptance among economic experts and accounting scholars (Shyam-Sunder and Myers, 1999; Fama and French, 2002; Oboh *et al.*, 2012; Sankay *et al.*, 2013). Donaldson refuted the idea of a firm having a unique capital structure which maximizes its profitability. Whereas, most firms would rather maintain high liquidity position to meet due obligations and ensure smooth operational business flow, others would plough these liquid resources in long-term investments to maximize returns. However, the rationale for these remains vague to experts leading to ongoing debate among scholars. Usually, experts would assume that a firm has no

well-defined targeted debt-to-value ratio (Fama and French; 2002; Myers, 2001; Khrawish and Khraiwesh, 2010), rather, it adheres to the Donaldson's model of a well-defined order of financing its investment projects. This persuasion is as modeled in the following equation:

$$\Delta DR_t = \alpha_t + \beta_1 \Delta \pi_t + \varepsilon_t$$

Where ΔDR_t is the level of change in a firm's debt ratio for a period *t* and $\Delta \pi_t$ is the level of change in its profitability for the same period *t*. Corporate debt is thus dependent on whether, or not retained earnings are sufficient to finance long-term investment projects. That is, when a firm would rather plough its internal funds to finance long-term investment projects, its desires for debt will invariably be lessened (Donaldson, 1961; Fama and French; 2002; Khrawish and Khraiwesh, 2010; Myers, 2001). Therefore maintaining an efficient working capital position, would only be a mirage since liquid resources would be traded for more profitability. To this end, in order to establish a relationship between a firm's working capital composition and its debt structure, the first hypothesis for the study as stated in the null is:

H_{o1}: A firm's financing decision has no significant influence on its working capital composition.

This is modeled as follows:

$$H_{01}: \Delta WCR_{it} \neq \Delta DR_{it}$$

Where ΔWCR_{it} is the level of change in the working capital ratio and ΔDR_{it} is the level of change in the debt ratio for firm *i* in period *t*. In essence, H_{o1}, simply suggests that the variation in a firm's debt-equity structure has no significant influence on the variation in its working capital composition. To conceptualize this prediction, means that, although a firm may adhere to the pecking-order predictions of preferring internal funds to debt and equity in financing long-term investment projects, it does not affect its working capital optimization. However, to regard the pecking order predictions as being applicable to corporate financing decisions (Sankay *et al.*, 2013), then optimality of a firm's working capital remains a function of its debt to equity interplay. Consequently, the alternate hypothesis (H_{i1}) to attest to this position states:

H_{i1}: A firm's financing decision has a significant influence on its working capital composition.

Working Capital Composition and Corporate Profitability

Generally, extant literature concentrates more on the long-term financial decisions of corporate entities than any other area in corporate finance. To be specific, more studies have focused on investments and capital structure decisions, dividend policies and company valuation decisions (See Myers, 1984; Titman and Wessels, 1988; Miller, 1977; Fama and French, 2002; De Angelo and Masulis, 1980; Bradley *et al.*, 1984; Barclay and Smith, 1999; Oboh *et al.*, 2012; Sankay *et al.*, 2013).

However, Pandey (1999), argued that a firm's financing decision is different from its financial structure suggesting that the various means used to raise funds (both short-term and long-term) represent the firm's financial structure, while its financing decision represents the proportionate relationship between its long-

term debt and equity capital. In support of Pandey's (1999) argument, it could be held that when a firm, through a unique debt-equity ratio is considering maximizing its returns and minimizing associated risks, a follow-up decision on its working capital composition would be needed. Further, since these short-term assets and liabilities are imperative components of total assets, to attain working capital optimality, significant management is required alongside the debt-equity disposition. For instance, Salawu (2007) noted that corporate distresses and collapses are associated with inapt capital mix, capital glitches and mismanagement of funds in Nigeria as in other third world nations.

Recent studies have presented varied reports on working capital optimality for individual firms. Hayajneh and Yassine (2011), and Quayyum (2011) noted that firm's profitability negatively relates to working capital ratios. Ogundipe, Idowu and Ogundipe (2012) also observed a negative relationship between working capital management and market valuation as well as performance. Ganesan (2007) argued that although "days working capital" is negatively related to profitability, the impact was not significant in the telecommunications industry. Whereas, Agyei and Yeboah (2011) argued that bank's cash-operating cycle positively relates with profitability as well as debtors' collection period. Ching, Novazzi and Gerab (2011) investigated the effect of working capital composition on firm's profitability, using two separate groups of companies; a fixed-capital intensive group and a working-capital intensive group as case studies. Their results revealed that a firm's working capital management would significantly affect its profitability irrespective of the group it belongs. Therefore, with regard to these arguments, the second hypothesis for the study stated in the null, is:

H_{o2}: A firm's profitability is not significantly influenced by its working capital composition.

This proposition is modeled as follows:

$$H_{o2}: \Delta \pi_{it} \neq \Delta WCR_{it}$$

Where $\Delta \pi_{it}$ represents the level of change in profitability and ΔWCR_{it} is the level of change in the working capital ratio for firm *i* in period *t*. The hypothesis thus holds that a firm's profitability is not affected by its working capital composition. This implies that, a firm can maximize profitability without necessarily trading-up its liquidity position. However, studies have suggested that a firm's short-term assets form a vital part of its total assets, and firms must maintain a level of current assets to current liabilities in order to maximize returns and ensure operational efficiency (Smith, 1980; Eljelly, 2004; Mukhopadhyay, 2004). Therefore, the alternate hypothesis is:

H_{i2}: A firm's profitability is significantly influenced by its working capital composition.

The arguments in this hypothesis anchor on three basic approaches of working capital management as discussed by Nwankwo and Osho (2010). First, the 'conservative approach', which suggests that when firms maintain larger quantity of current assets in relation to total assets, then profitability is lower resulting from lesser risks. Secondly, to follow the

‘ aggressive approach’, firms would yield higher profitability resulting from higher risks when they maintain relatively small portion of total assets in the form of current assets. Lastly, with the ‘ moderate approach’, firm’s risks are moderated; however, the firms would be unable to pay-off matured obligations. Hence, to complement these approaches, the alternate hypothesis, H_{i2} argues that if a firm decides to maintain more liquidity in its possession, then it would be at the expense of profitability. Otherwise, if it decides to maximize profitability, then it will be exposed to higher risks of insolvency.

Financing Decision and Corporate Profitability

Economic experts and scholars have argued variedly regarding the relationship between financing decision and profitability. Whereas, most scholars have argued synchronously with the pecking-order predictions, suggesting that corporate financing decision relates negatively with profitability (Donaldson, 1961; Myers, 2001; Khrawish and Khraiwesh, 2010; Hayajneh and Yassine, 2011; Ching *et al.*, 2011; Ogundipe *et al.*, 2012; Sankay *et al.*, 2013). Others have averred to the contrary, proposing a positive relationship between corporate financing decision, market valuation and profitability (see Modigliani and Miller, 1963; Jensen and Meckling, 1976; Adelegan, 2007; Salawu and Agboola, 2008; Mollik, 2008; Oboh *et al.*, 2012). Therefore, to speculate the logic of these arguments on whether a relationship exists between these two variables, this study presents its third hypothesis in the null form:

H_{o3}: A firm’s financing decision choice does not affect its profitability.

This proposition is modeled as follows:

$$H_{o3}: \Delta \pi_{it} \neq \Delta DR_{it}$$

Where $\Delta \pi_{it}$ is the level of change in the profitability and ΔDR_{it} is the level of change in the debt ratio for firm *i* in period *t*. H_{o3} thus holds that a firm’s profitability is not affected by its leverage, that is, a firm can maximize profitability without any necessary interloping from its choice of debt-equity mix. However, to acquiesce with this position is to negate the suggestion in Adeyemi and Oboh (2011) that the financing decision of a firm is strategic and a significant managerial tool in achieving its financial objectives. Pandey (2005) also noted that it influences the shareholders risk and return, and subsequently affects the market valuation of the firm. Hence, to counter H_{o3}, the alternate hypothesis (H_{i3}) states that:

H_{i3}: A firm’s financing decision choice affects its profitability.

Interactions between Working Capital Management, Financing decisions and Profitability

Most studies have argued on an individual account on how these twin-financial strategies affect corporate profitability. Such studies have provided varied reports, however, more studies have reported negative effects than positive (see Donaldson, 1961; Modigliani and Miller, 1963; Myers, 2001; Jensen and Meckling, 1976; Khrawish and Khraiwesh, 2010; Hayajneh and Yassine, 2011; Ching *et al.*, 2011; Ogundipe *et al.*, 2012; Sankay *et al.*, 2013). Having established a theoretical perspective and highlighted empirical evidence on the individual

effects of a firm's working capital composition and financing decision, on its profitability, this study argues that to attain profit optimality, a firm must strike a balance between its working capital ratio (WCR) and debt ratio (DR) to the point where synergy is attained. This is relatively possible, only where each of these financial strategies is simultaneously pursued. That is, as the firm decides on its financing decision choice, it is synchronously deciding on its working capital composition. In other words, no one decision is solely pursued. Coherent with the logic of this thought, this study presents its fourth hypothesis in the null form:

H_{o4}: The combined interaction of a firm's working capital and debt ratios would not significantly affect its profitability.

Functionally, this conjectural persuasion is modelled as follows:

$$H_{o4}: \Delta \pi_{it} \neq \Delta (WCR_{it} * DR_{it})$$

Where $\Delta \pi_{it}$ represents the level of change in profitability and $\Delta (WCR_{it} * DR_{it})$ is the level of change in the combined interaction of the working capital ratio and debt ratio for firm *i* in period *t*. The null hypothesis (H_{o4}) thus holds that the variation in a firm's profitability is not affected by the combined interaction of its working capital and debt ratios. An alternate to this position H_{i4}, is that:

H_{i4}: The combined interaction of a firm's working capital and debt ratios would significantly affect its profitability.

Conceptual Model

The conceptual model developed for the study as shown in Figure 1 depicts the proposed relationships between these twin-financing strategies and profit optimality as formulated in the study's hypotheses (H_{i1}- H_{i4}). First, the figure shows the interplay between a firm's working capital ratio (WCR) and its debt ratio (DR) in adherence to the pecking-order predictions. This simply indicates that a firm's working capital composition would depend on its choice of debt-equity mix when the firm ploughs internal funds to finance long-term investment projects. Secondly, the figure shows that both working capital ratio (WCR) and debt ratio (DR) would individually affect firm's profitability (π) and thirdly, that the interaction of the two variables would affect profitability.

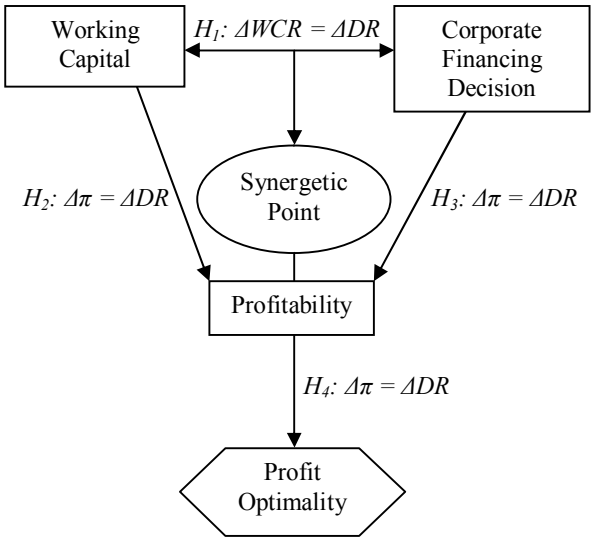

Figure 1. Study's Conceptual framework of the Synergetic Effect of the interaction between Working Capital Management and Financing Decision on Corporate Profitability

METHODOLOGY

Sample and Procedure

For the purpose of collecting data for this study, a panel dataset (cross-sectional and time series) was constructed from the annual audited financial reports of 35 manufacturing companies listed on

the Nigerian stock exchange for each of the two years ending 2011 and 2012. A purposeful sampling technique was adopted to select the sample based on data availability and set criteria by the researcher. First, the total manufacturing companies listed on the Exchange in 2012 was ascertained to be 59 companies, grouped under three industries (see Appendix-II). Then, companies (6 companies) with missing figures and negative values of variables of interest, for example losses (negative profit figures) and companies with no publicly available annual reports for the two consecutive years (18 companies) were excluded, bringing the sample to 35 companies, with two years' annual reports giving a total of 70 observations.

Description of Variables

The key variables studied were working capital ratio *(WCR)*, debt ratio *(DR)*, and profitability ratio (π) with firm's size included in one of the models as a control variable.

-**Working capital ratio:** This has been measured in this study using the acid-test ratio (quick ratio) as proxy. This is computed as current assets, less stock, divided by current liabilities *(CA-S/CL)*, and the parameter for assessing the efficiency of this ratio is usually assumed to be 1:1 (Brewer, Garrison and Noreen, 2007). This was decided due to the logic the study seeks to explore. First, the study holds that a firm's working capital composition is not a separate decision from its financing decision (capital structure). Secondly, the study does not intend to measure the time lag of cash conversion; rather, the components of the firm's working capital are the interest of the study. A checklist of the components of firm's total debt, equity capital and working capital, as constructed from the annual financials of the sampled firms (financial years 2011 and 2012) is provided in Appendix-I.

-**Debt ratio:** Scholars and experts have employed a broad choice of debt ratios as measurement for financial leverage ranging from short-term debt to shareholder's equity; long-term debt to shareholder's equity; and total debt to equity capital (see Mollik, 2008; Hamson, 1992; Oboh *et al.*, 2012; Sankay *et al.*, 2013). For the purpose of this study the DR was measured using the ratio of total-debt (both long-term and short-term debts) to shareholder's equity. The rationale for this was based on the logic presented in the pecking-order assumptions, that a firm's capital structure has no unique composition; but rather, that it follows a well-defined order (Donaldson, 1961; Myers, 1984). Furthermore, considering the fact that most companies in Nigeria would scarcely utilize long-term debt in their capital structure composition (Adeyemi and Oboh, 2011), which if singled out would shrivel the sample size and may not give a realistic position of the actual effect of corporate capital structure on profitability.

-**Profitability:** Firm's profitability measure was adapted from Lazaridis and Tryfonidis (2006) which used the ratio of firm's gross operating profits to capital employed (net-asset), i.e. π = GOP/CE as a measure for corporate profitability ratio. In order to compute this ratio, cost of sales was subtracted from turnover to arrive at the gross operating profit which was then divided by net-asset. This measure of profitability was used

because, the study sought to exclude as much as possible, any intrusion on profitability due to unnecessary costs which would have been captured in the distribution and administrative expenses. Many firms, in order to manipulate their profits for tax purposes and other questionable intentions, would deliberately inflate their expenses. Therefore, to capture the true state of the firm's profitability, the firm's gross operating profit seems reasonable.

-Firm Size : In line with other studies of working capital management and profitability, (e.g. Raheman and Nasr, 2007), this study included firm size as a control variable, measured using the natural logarithm of sales as proxy. The inclusion of this control variable is justified on the basis of ample literature which provided evidence regarding the fundamental effect of firm size on firm profitability (Babalola, 2013; Lee, 2009) and firm size on working capital management (Chiou, Cheng and Wu, 2006; Josse, Lancaster and Stevens, 1996).

Empirical Modelling and Estimation Method

Three models were specified to empirically establish the proposed relationships among firm's working capital ratio, debt-equity ratio, and profitability. The statistical analyses performed with the aid of EViews econometric software are as follows: First, descriptive statistics were obtained for the explanatory and outcome variables. Then, Pearson correlation analysis was performed in order to examine the relationships between variables and check for multicollinearity problem among the explanatory variables. This was to further augment the Durbin Watson test of autocorrelation. After these, using the EViews software, Model 1 was estimated to test hypothesis 1, using Swamy and Arora estimator of component variances. Wallace and Hussain estimator of component variances was used to estimate Model 2 and to test each of the associated hypotheses (H_{02} and H_{03}), while Factorial-ANOVA test was performed using SPSS software to estimate the synergetic effect of these variables ($WCR*DR$) on corporate profitability (Model 3) as a test to hypothesis 4 the econometric models are as follows:

$$WCR_{it} = \beta_0 + \beta_1 DR_{it} + \varepsilon_{it} \quad \ldots\ldots (1)$$

$$\pi_{it} = \beta_0 + \beta_1 WCR_{it} + \beta_2 DR_{it} + \beta_3 SIZE_{it} + \varepsilon_{it} \quad \ldots\ldots (2)$$

$$\pi_{it} = \beta_0 + \beta_1 WCR_{it} + \beta_2 DR_{it} + \beta_3 (WCR*DR)_{it} + \varepsilon_{it} \quad \ldots\ldots (3)$$

Where:

WCR_{it} represents the working capital ratio; DR_{it} is the debt ratio; and $(WCR*DR)_{it}$ is the combination of these ratios; π_{it} represents firm's profitability and $SIZE_{it}$ is the size for firm i in t period, ε_i is the error term and $\beta 0, \beta 1, \beta 2, \beta 3$ are the intercept and variables' coefficients.

RESULTS

Descriptive Statistics

Mean, Standard deviation, Skewness and Kurtosis statistics were computed for each of the respective variables. To account for the Skewness of the distribution, a right-tailed position indicates a positively skewed distribution and a left-tailed position indicates a negatively skewed distribution, while Kurtosis statistic indicates either substantial peak distribution, or

flatter peak distribution. Table 1 reports the results of this analysis.

As shown in Table 1, the mean score (1.59) for profitability (π) indicated low profitability across the sampled firms, having a right-tailed skewness with a substantial peak value (Skewness = 1.91 & kurtosis = 7.20 respectively).

	π	*WCR*	*DR*	*SIZE*
Mean	1.59	0.86	1.68	7.11
Median	1.18	0.68	1.11	7.15
Maximum	8.03	4.33	8.15	8.45
Minimum	0.08	0.07	0.32	4.48
Std. Dev.	1.52	0.69	1.60	0.88
Skewness	1.91	2.39	2.43	-0.77
Kurtosis	7.20	11.37	9.15	3.49
Sum	111.52	60.23	118.10	498.36
Sum Sq. Dev.	160.35	33.46	176.88	54.15
Total Observ.	70	70	70	70

Table 1. Descriptive Statistics

Likewise, the mean score (0.86) for *WCR* indicated that, on the average most firms have low liquidity position, having the skewness of distribution to be right-tailed, with a substantial peak value (Skewness = 2.38 & kurtosis = 11.37 respectively). Furthermore, the mean score (1.68) for *DR* indicated a relatively low debt-equity ratio across the sampled firms, suggesting that the debt level of these firms is much lower compared to their equity capital. This variable has also indicated a right-tailed Skewness distribution with a substantial peak value (Skewness = 2.43 & kurtosis = 9.15 respectively).

In contrast, the mean score (7.11) for *SIZE* suggests larger firms across the sampled firms, with a left-tailed Skewness distribution and a slightly peaked value (Skewness = −0.76 & kurtosis = 3.48 respectively).

Correlation Analysis

Table 2 reports the outcome of the correlation analysis performed at a 0.05 level of significance to establish correlations among the variables and to test for collinearity problem.

As presented in Table 2, only *DR* among the explanatory variables related significantly and positively with the outcome variable – profitability (π) ($p = 0.001$; r = .55) and to consider the relationship among the explanatory variables, it could be seen that *DR* variable showed a significant, but negative relationship with *WCR* variable ($p = 0.004$ and r = −.47 respectively). This simply means that, these variables are inversely related, that is, the higher one goes, the lower the other becomes. However, this would have been a point of concern as relating to collinearity intrusion; but on the contrary, since it

		1	2	3
1	**π**			
2	**WCR**	-.27		
3	**DR**	.55**	-.47**	
4	**SIZE**	-.01	-.17	-.20

** $p < 0.001$ (2-tailed); N = 35*

*** $p < 0.005$*

Table 2. Correlation Matrix

is in the interest of the study to empirically establish an interaction between these two key variables as presented in Model 1, the correlation is expected, however no correlation was found among the other explanatory variables; hence, the regression estimate is free from multicollinearity intrusion.

Estimation of Model 1

This study's first proposition as stated in the null form is that, the variation in a firm's debt-equity structure *(DR)* has no significant influence on its working capital composition *(WCR)*. To empirically validate this position, the Swamy and Arora estimator of component variances (a two-way random effects panel) was performed at a 0.05 level of significance, and the results are reported in Table 3.

Variable	Coefficient	S. E	*t-Statistic*	Prob.
DR	-0.09	0.03	-2.87	0.005
C	1.02	0.11	8.65	0.000
Weighted Statistics				
R-squared	0.10		Mean dependent variable	0.25
Adjusted R-squared	0.09		S.D. dependent variable	0.27
S.E. of regression	0.25		Sum squared residual	4.53
F-statistic	8.25		Durbin-Watson statistics	1.88
Prob.(*F-statistic*)	0.005		Total panel (balanced) observation:	70

Depend.Var.: WCR; Sample: 2011 2012; Method: Panel EGLS (Two-way random effects); Periods included: 2; Cross-sections included: 35

Table 3. Swamy and Arora Estimator of Component Variances

As reported in Table 3, the *DR* variable significantly predicted the variation of *WCR* variable *($p = 0.005 < 0.05$).* However, this relationship was found to be negative *($\beta = -0.09$* and *t-statistics $= -2.87$)* meaning that, these two variables *(DR and WCR)* are inversely related to each other. As indicated by the *F-ratio (8.25)* and its significance value *is 0.005, so,* the null hypothesis 1 was rejected, and the alternate hypothesis retained. That is, *" a firm's financing decision has a significant influence on its working capital composition"*. The *R square (0.10)* and Adjusted R square *(0.09)* suggested that Model 1 explains 11 percent variation in the outcome variable *(WCR)* and that when applied to the real world, only 10 percent variation in the outcome variable *(WCR)* is predicted by the explanatory variable *(DR)*. Finally, the test for autocorrelation, as estimated by the Durbin-Watson test statistics (*1.88)*, suggested that Model 1 did not violate the independence of residuals assumptions (i.e. no collinearity problem).

Estimation of Model 2

Model 2 was estimated using the Wallace and Hussain estimator of component variances (a random-effect panel analysis tool). In order to control the estimation of variation, this model included a control variable – *firm size.* It tested the assumptions in H_{o2} and H_{o3} on the individual effects of the firm's working capital composition and debt structure on their profitability. As reported by Gurajati (2004), to apply this technique, researchers are usually faced with the option of choosing between using the fixed-effect

panel model or the random-effect panel model, while the Hausman test is largely suggested by scholars to justify the choice of model to adopt. This test, checks for a more efficient model against a less efficient but consistent model and ensures that the more efficient model gives consistent results. It tests the null hypothesis that the coefficients estimated by the efficient random-effects estimator are the same as the ones estimated by the consistent fixed-effects estimator. If they are (i.e. non-significant *p-value*, *prob* > χ^2, larger than 0.05) then it is safe to use random effects, but if a significant *p-value* is obtained, the fixed-effects model should be adopted (see Gujarati, 2004). A significant correlation between the unobserved person-specific random effects and the regressors would mean that the random effects model would be inconsistently estimated and the fixed effects model would be the model of choice. If there is no such correlation, then the random effects model may be more powerful and parsimonious. The result is as presented in Table 4.

Test Summary	Chi-Sq. Statistic	*df*	Prob.
Cross-section random	4.030	4	0.402
Period random	0.105	4	0.999
Cross-section and period random	3.999	4	0.406

Test cross-section and period random effects

Table 4: Hausman Test

As observed from Table 4, no statistically significant correlation was found between the unobserved person-specific random effects and the regressors as the *p-value (p = 0.40)* reported is greater than alpha *(α = 0.05).* Therefore, the random effects model as recommended based on this result (since it gives a more robust estimation of the model) was used to estimate Model 2.The result of estimation is presented in Table 5.

The result as reported in Table 5, showed a significant positive relationship between *DR* and π (*p = 0.0001* and *t-statistics = 4.26* respectively) indicating that the higher the firm's total-debt to shareholder's equity, the more profitable the firms become.

In contrast, no significant relationship was found between *WCR* and π (*p = 0.79* and *t-statistics = -0.26* respectively), H_{o2} was therefore upheld while H_{o3} was rejected, and the alternate H_{i3} retained. Furthermore, a non-significant relationship was found between *SIZE* and profitability (π) (*p = 0.46* and *t-statistics = 0.73* respectively).

However, the model containing all the variables of interest achieved statistical significance, as indicated by the *F-ratio* and its associated *p-value (8.12* and *0.0001* respectively), suggesting that the firm's profitability is affected by the nature of its working capital composition and debt structure. The strength of the model's predictions measured by the R square (0.26) and adjusted R square (0.23) suggested that the model significantly explained 26.98 percent variation in the outcome variable (π) and that when applied to the real world, 23.66 percent variation in the outcome variable (π) is predicted by the explanatory variables (*WCR*, *DR*, and *SIZE*) included in the model. This result indicated the need for the test of interaction effect of the variables.

In addition, the Durbin–Watson test was performed to check for multicollinearity problem in the model. The result (2.02) suggested that the model did not violate the independence of residuals assumptions (i.e. no collinearity problem) based on the assumption in Kohler (1994).

Variable	*β*	Std. Error	*t-Statistic*	Prob.
WCR	-0.06	0.241	-0.262	0.794
DR	0.41	0.097	4.266	0.000
SIZE	0.13	0.180	0.739	0.463
C	-0.00	1.641	-0.002	0.999
Weighted Statistics				
R-squared	0.270	Mean dependent var.		0.214
Adjusted R-squared	0.237	S.D. dependent var.		1.057
S.E. of regression	0.923	Sum squared resid.		56.250
F-statistic	8.127	Durbin-Watson stat.		2.028
Prob(*F-statistic*)	0.000	Total panel (balanced) obs.:		70

Dependent Variable: π; Method: Panel EGLS (Two-way random effects); Sample: 2011 2012
Periods included 2; Cross-sections included 35.

Table 5. Wallace and Hussain estimator of component variances

Estimation of Model 3

Model 3 was estimated using a *Factorial–ANOVA* design in order to test H_{o4} which sought to establish a statistical interaction effect of a firm's working capital composition and debt structure on its profitability. The mechanics behind this design was simply a replicate of the ANOVA estimator, only that the explanatory variables have been included as covariates and not fixed factors in the analysis (see Field, 2005). This was done in order to isolate the actual interactive effect of the combined variations of each of the explanatory variables on the outcome variable. To perform this analysis, the mean score for each of the participating variables for the two–year period were determined. Then the figures obtained, which formed the new set of

Source	Sum of Squares	*df*	Mean Square	*F*	Sig.
Corrected Model	15.89(b)	3	5.29	7.97	.001
Intercept	6.86	1	6.86	10.33	.003
WCR	3.47	1	3.47	5.22	.029
DR	.04	1	.041	.06	.805
*DR*WCR*	4.60	1	4.60	6.92	.013
Error	20.59	31	.66		
Total	125.31	35			
Corrected Total	36.48	34			
Parameter Estimates					
Variable	***β***	**Std. Error**	***t-Statistic***	**Sig.**	
Intercept	1.27	.39	3.21	.003	
WCR	-1.05	.46	-2.28	.029	
DR	-.05	.21	-.24	.805	
*DR*WCR*	1.29	.49	2.63	.013	

Computed using alpha = .05; b. R Squared = .435 (Adjusted R Squared = .381); Dependent Var.: π

Table 6. Factorial ANOVA - Tests of Between-Subjects Effects

data for the study were used to run the *factorial-ANOVA* at 0.05 level of significance. Table 6 presents the outcome of this test. As shown in Table 6, in consideration of the interaction effects of these two explanatory variables *(DR*WCR*) on the outcome variable *(π)*, the outcome was significant (*F-ratio = 6.92,* with *p = 0.01>0.05*), and the relationship positive (*t-statistics = 2.63*). This is suggestive that, as the firm strategically considers both its working capital composition and debt structure decisions side by side, and by striking a balance between them, then profitability is affected positively. Considering the model's *F-ratio* (7.97) and its *significance* (0.001), H_{o4} was rejected and the alternate hypothesis H_{i4} retained, which averred that, *" the interaction of a firm's working capital and debt ratios would significantly affect its profitability"*.

Finally, in assessing the robustness of this analysis, the R square and adjusted R square values of 0.43 and 0.38 respectively suggest that Model 3 significantly explains 43.5 percent variation in the outcome variable (π), and that, when applied to the real world, only 38.1 percent variation in the outcome variable (π) was predicted by the explanatory variables included in the model.

DISCUSSION

To generalize, the variables measured in this study appeared to be positively (right-tailed) distributed and substantially peaked, with the exception of *SIZE*, which appeared to be negatively (left-tailed) distributed and only slightly peaked. The normal distribution for statistical data is expected to be a zero (0) value, without a right-tail nor left-tail distribution, and neither a leptokurtic (peak), or platykurtic (flat) distribution (Field, 2005). Although, these results appear to suggest that the data may be violating the normality assumption, this should not be generalized as other factors including the sample size, time lag (sample period), as well as population grouping could affect the normal distribution of data with less interference with the outcome of the regression model (Sankay *et al.,* 2013).

The result of the test of hypothesis 3 which yielded significant positive relationship between *DR* and π coincides with the Modigliani and Miller (1963) capital structure relevance theory, indicating that the higher the firm's total-debt to shareholder's equity, the more profitable the firms become. This view however appears to disagree with the Donaldson (1961) pecking-order theory, which suggests that a firm should prefer internal funds first irrespective of any associated benefits accruing from any external finance source.

The test of hypothesis 2 which reported no significant relationship between *WCR* and π appears to contrast prior studies (see Hayajneh and Yassine, 2011; Quayyum, 2011; Ogundipe *et al.*, 2012) that reported a significant negative relationship between these two variables.

However, the fact of the statistical significance of the model containing the variables with the R square of 0.26 and adjusted R square of 0.23 suggesting that the model significantly explains 26.98 percent variation in the outcome variable (π) is an indication that the outcome variable can be predicted by the explanatory variables (*WCR*, *DR*, and *SIZE*) included in the model.

In consideration of the interaction effects of these two explanatory variables (*DR*WCR*) on the outcome variable (π), the significant positive relationship found (*F-ratio = 6.92, p = 0.013 > 0.05; t-statistics = 2.63*) is suggestive that, as the firm strategically considers both its working capital composition and debt structure decisions side by side, and by striking a balance between them, profitability is affected positively. This logic coincides with the pecking-order hypothesis, where as a firm decides to invest its internal funds in long-term investment projects (Donaldson, 1961), with a view to still maintain an efficient liquidity position, then to maximize profitability, an equilibrium position must be attained between the working capital composition and debt structure decisions.

CONCLUSION

Ensuing from the analogy presented by Donaldson (1961) on the pecking order theory of corporate capital structure, where internal fund is preferred to debt and equity when financing investment projects, this study has provided empirical evidence on the interaction of working capital composition and corporate debt structure, and the effects of the interaction on corporate profitability. First, the study found that the firm's working capital composition interacts negatively with their debt structure choice. Then, on an individual basis, the firm's working capital composition was not found to significantly relate with profitability, while on the other hand, the firm's debt structure was found to relate positively with profitability in acquiescence to the Modigliani and Miller (1963) assertion, where 100 percent debt utilization is suggested for firms to maximize value.

However, in consideration to an interaction effect, the study found a significant positive effect on profits. The study thus holds that corporate profitability is positively affected as firms decide on their working capital composition synchronously with their debt structure.

IMPLICATIONS

The findings of this study indicate that the twin financial strategic decisions working capital and financing decisions are interrelated and must be pursued concomitantly for firms to optimize their profitability position. For financial managers, this implies that corporate financing decision should not be independently taken without due consideration of the working capital composition. If the pecking order predictions should be adopted when deciding on the choice of finance source, then due caution and appraisal must be taken in order not to shrill the liquidity position of the firms, which will only expose them to more risks.

LIMITATIONS AND FUTURE DIRECTIONS

The scope of this study was limited to only manufacturing companies quoted on the Nigerian stock exchange. This implies that many manufacturing companies have been excluded from the study. Furthermore only a small sample of 35 companies was selected among the quoted manufacturing companies and data were only obtained for a two-year period. Caution should therefore be exercised in generalizing its findings to all manufacturing companies or to companies in other industries. In addition, the variables in the

study have been measured through the use of proxy variables which may not be unbiased estimators of the unobserved variables. For instance, working capital management was examined using only quick ratio in contrast to studies that used several proxy variables including current ratio, average collection period, inventory turnover (e.g. Raheman and Nasr, 2007). Furthermore, although, this study was able to achieve its objectives, not all extant explanatory factors affecting corporate profitability and not all working capital management and financing decision components were covered in the study. It is therefore suggested that in-depth studies including these other factors are necessary. The scope of the study may also be extended to cover a larger sample of manufacturing companies over a longer period of time to yield more insights into the study of the variables of interest in this study.

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Appendix–I

CHECKLIST FOR FIRM'S TOTAL DEBT, EQUITY CAPITAL AND WORKING CAPITAL COMPOSITION

Total Debt	Shareholders equity	Working Capital
Long-term		***Current Assets***
Debenture shares	Ordinary share Capital	Cash and Bank Balances
Long term loans	Share premium	Inventories: Raw-material, Work-in-progress and Finished Goods
Deferred tax	Revenue Reserves	Spare parts
Other non-current liabilities	Revaluation Reserves	Account receivables
- Employee Gratuity	Capital Reserves	Bills receivables
		Accrued Income
		Prepaid expenses
		Short term investments
		Due from related companies
Short-term		***Current Liabilities***
Bank Overdraft		Bank Overdraft
Creditors		Creditors
Outstanding Expenses		Outstanding Expenses
Bills Payable		Bills Payable
Short-term Loans		Short-term Loans
Proposed Dividends		Proposed Dividends
Provision for Taxation,		Provision for Taxation,
Due to related companies		Due to related companies

Sources: Annual financial reports of the sampled companies (2011-2012)

Appendix-II

LIST OF COMPANIES SAMPLED

S/N	Companies	Industry	S/N	Companies	Industry
1	7-Up Bottling Comp. Plc.	Consumer Goods	19	International Breweries Plc.	Consumer Goods
2	Adswitch Plc.	Industrial Goods	20	John Holt Plc.	Conglomerates
3	Ashaka Cement Plc.	Industrial Goods	21	Lafarge Wapco Plc.	Industrial Goods
4	Berger Paints Plc.	Industrial Goods	22	Mcnichols Plc.	Consumer Goods
5	Beta Glass Co Plc.	Industrial Goods	23	Multi-Trex Integrated Foods	Consumer Goods
6	Cadbury Nigeria Plc.	Consumer Goods	24	National Salt Co. Nig. Plc.	Consumer Goods
7	Cap Plc.	Industrial Goods	25	Nestle Nigeria Plc.	Consumer Goods
8	Cement Co. of North. Nig. Plc.	Consumer Goods	26	Nigerian Brew. Plc.	Consumer Goods
9	Chellarams Plc.	Conglomerates	27	Nigeria Ropes Plc.	Industrial Goods
10	Cutix Plc.	Industrial Goods	28	P Z Cussons Nigeria Plc.	Consumer Goods
11	Dangote Cement Plc.	Industrial Goods	29	Paints And Coatings Man. Plc.	Industrial Goods
12	Dangote Flour Mills Plc.	Consumer Goods	30	Portland Paints & Products Plc.	Industrial Goods
13	Dangote Sugar Refinery Plc.	Consumer Goods	31	S C O A Nig. Plc.	Conglomerates
14	First Aluminum Plc.	Industrial Goods	32	Transnational Corp of Nig. Plc.	Conglomerates
15	Flour Mills Nig. Plc.	Consumer Goods	33	U A C N Plc.	Conglomerates
16	Greif Nigeria Plc.	Industrial Goods	34	Unilever Nigeria Plc.	Consumer Goods
17	Guinness Nig. Plc.	Consumer Goods	35	Vitafoam Nig. Plc.	Consumer Goods
18	Honeywell Flour Mill Plc.	Consumer Goods			

Source: The Nigerian Stock Exchange (2013). Listing. Retrieved April from http://www.nse.com.ng