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What are the Determinants of Working Capital Requirements of Nigerian Firms?

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Abstract
The purpose of this paper is to examine the determinants of working capital requirements of thirty non-financial firms listed on the Nigerian Stock Exchange between 2004 and 2011. Panel data methodology was employed and Ordinary Least Squares (OLS) used as estimation technique. The Working capital requirement (firm's net working capital deflated by total assets) was used as dependent variable. Regression results reveal that five explanatory variables- firm's leverage, size, industry classification, return on asset and operating cycle are significant factors that determine the firms' working capital requirements for the period under study. The outcome of this study supports the findings of some previous studies and is also consistent with financial theory.
Keywords: Working Capital Requirements, ROA, Leverage, Size, Pecking Order, Nigeria.

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1 INTRODUCTION

It is just of recent that attention of researchers in Financial Management has turned to the studies of short-term financing. Hitherto, efforts were geared toward the studies of long-term financing, particularly capital structure, dividend policy, investment decision, etc.

There are two concepts of working capital- gross and net. Gross working capital refers to the amounts invested in a firm's current assets. Proponents of this concept opine that an efficient management of current assets will improve the profitability of the organization. Net working capital is the excess of current assets over current liabilities. The relevant of this concept of working capital is that the solvency of a firm is measured by the net working capital position it commands.

Working capital management is concerned with efficient management of different components of working capital- current assets and current liabilities. Managers of firms are required to operate at optimal level of working capital. Excess working capital is not an ideal level because capital will be tied up unnecessarily and this will not generate additional income to the firm. Also, inadequate working capital may lead to the collapse of the firm because there will be disruption in the production process since the firm will not be able to meet up with its short-term commitments. Deloof (2003), Howorth and Westhead (2003), and Afza and Nazr (2007) affirm that firms try to maintain an optimal level of working capital that maximizes that value. Working capital is seen to affect the liquidity and profitability of the firm (Raheman and Nasr 2007) as well as the risk of the business (Smith 1980).

Most studies in working capital management in developing and emerging countries as found in the extant literature examined the relationship between working capital and firm performance. Factors that determine the working capital management are often not explored. The lack of clarity about the determinant factors of working capital especially in an emerging economy like Nigeria is the motivating factor for this study.

This present study wants to fill in the gap noticed in the previous studies by looking at factors that influence the working capital of 30 listed non-financial firms in Nigerian business environment, for the period 2004-2011.

The rest of this paper is organized as follows: section 2 deals with literature review, while in section 3, the methodology of the study is discussed. Section 4 presents the results and discussion and section 5 concludes the study.

2 LITERATURE REVIEW

The financial management literature contains so many studied that have been conducted on working capital management, especially for companies in the developed countries and to some extent, in the Middle East Asian countries. Different aspects of working capital management, including, but not limited to studies involving,

liquidity-profitability relationship; working capital and firm performance; importance of working capital management; working capital policies- aggressive/ conservative and performance, etc but few of studies on determinants of working capital. First we report studies conducted on the relationship between working capital management and then studies involving testing the relationship between working capital requirements and its determining factors.

Shin and Soenen (1998), using sample of firms in the USA for the period 1975 to 1998 conclude that a well managed working capital has significant impact on profitability of firms. The result further show a positive correlation between the firm size and working capital management and that industry concentration does not affect working capital management.

Deloof (2003) utilizing data from Belgian firms also arrive at the same conclusion. He further report that an increase in profitability will result from reduction in number of day's account receivables and inventories.

Ejelly (2004) utilizes data from 929 Saudi Arabian firms and concludes that the size of working capital variables have significant effect on profitability at the industry level. Padachi (2006) examines the impact of working capital on performance of 58 Mauritian firms between 1998 and 2003. He reports that high investment in inventories and receivables is associated with lower profitability.

Raheman and Nasr (2007) examine the effect of working capital management on both liquidity and profitability of 94 listed Pakistani firms for the period 1999-2004. Results show a strong and negative relationship between working capital management variables and profitability of the firm. It also shows a negative relationship between liquidity and profitability.

Raheema, Afza, Qayyum and Bodla (2010) analyze the impact of working capital management on firm's performance in Pakistan for the period 1998 to 2007. Using 204 listed manufacturing firms, the result indicate that the cash conversion cycle, net trade cycle and inventory turnover in days significantly affect the performance of the firms. The result also shows that financial leverage, sales growth and firm size are important variables that have influence on profitability. The study concludes that firms in Pakistan are following conservative working capital management policy.

In Nigeria, Falope and Ajilore (2009) studies the effect of working capital on profitability of 50 listed firms for the period 1996-2005 and report a negative relationship between working capital management-Cash Conversion Cycle (CCC) and financial performance-Return on Asset (ROA). Sen and Oruc (2009) use data from 49 Turkish listed firms confirm a negative relationship between cash conversion cycle and working capital both at firm and industry level.

Dong and Su (2010) examine the relationship between working capital management and firm performance of sampled firms in Vietnam for the period 2006-2008. The results show a negative relationship between profitability (gross operating profit) and working capital management (cash conversion cycle). They further conclude that managers can create a positive value for the shareholders by handling the adequate cash conversion cycle and keeping each different component to an optimum level.

Mohamad and Saad (2010) using a sample of 172 listed firms in Malaysia during the period 2003-2007 report a significant negative relationship between working capital and a firm's profitability.

Nwidobie (2012) examines working capital management efficiency and corporate profitability of 22 listed firms in Nigeria. Results show that costs of working capital of the firms exceed returns on working capital investment thereby affecting their profitability.

Studies that support a positive relationship between working capital management and profitability (conservative policy of working capital) are very few. Gill, Biger and Mathur (2010), using data from 88 American manufacturing firms for the period 2005-2007, confirm a positive relationship between cash conversion cycle and corporate profitability (gross operating profit).

Hawawini, Viallet and Vora (1986) examine the influence of a company's industry on its working capital management using data involving 1,181 USA firms over the period 1960 to 1979. Results show a substantial industry effect on firm's working capital management practices that is stable over time.

The results in Shin and Soenen (1998) further show a positive correlation between the firm size and working capital management and that industry concentration does not affect working capital management.

Moussawi, Laplante, Kieschnick and Baranchuk (2006) utilize data from the USA firms for the period 1990 to 2004 and provide evidences that industry practices, firm size, future firm sales growth, the proportion of outside directors on the board, executive compensation (current portion) and Chief Executive Officer share ownership significantly influence the efficiency of a company's working capital management.

Chiou and Cheng (2006) study the determinants of working capital management using different variables, such as industry effect, operating cash flows, growth opportunities, firm performance and size. The result shows that leverage and operating cash flows are the only variables that affect working capital management proxy of the firms during the period of study. Other variables (size, growth opportunities, firm performance) have insignificant relationship with working capital management proxy (net liquid balance).

Nazir and Afza (2008) investigate the working capital determinant factors of 204 Pakistani

manufacturing firms covering the period 1998 to 2006. Results provide evidences that operating cycle, leverage, ROA and Tobins'q significantly influence the firms' working capital requirements.

Nazir and Afza (2009) examine working capital requirements and the determining factors of 132 manufacturing firms from 14 industrial groups in Pakistan for the period 2004-2007. The results reveal a positive relationship between operating cycle and working capital requirement deflated by total asset. This suggests that the higher the days of operating cycle, the more working capital would be required by the firm as operative necessity. ROA, Tobin's q, leverage and industry classification are also determinant factors of the firms during the period of study as they show significant relationship with the working capital requirement proxy.

The major finding in the study conducted in Turkey by Uyar (2009) indicates that industrial sector influences the working capital requirements of the firms. The lowest mean of cash conversion cycle is found in the retail/wholesale industry with an average of 34.58 days and the highest mean value is found in the textile industry, with an average of 164.89 days. The result also indicates negative relationship between cash conversion cycle and profitability.

In their international studies on determinants of working capital management of five Latin American companies (Argentina, Brazil, Chile, Mexico and Peru), Mongrut, Feunzalida, Cubillas and Cubillas (2010), using unbalanced panel data of selected companies in these countries show that the industry cash conversion cycle, the company market power, its future sales and country risk have an influence on the way Latin American companies manage their working capital with significant differences among countries in the region.

Deesomsak and Chau (2011) explore the effects of firm-specific and market-specific determinants of working capital management of 399 Thai firms during the period 1992-2010. Results show that working capital management of a firm is driven by both its own characteristics and the overall economic environment. Specifically, the study concludes that firms with large size, high sales growth, profitable, high tangible assets, low probability of bankruptcy and high pay-out ratio tend to adapt aggressive working capital policy. On the other hand, firms with high level of short-term debt and dividend yield would adopt conservative policy. Corporate governance and ownership structure, industries, and level of economic activities also have significant impact on working capital management.

Nakamura and Palombini (2012) investigate the determinant factors of working capital management in the Brazilian market using 2,976 firm-year observations of companies listed on Sao Paulo Stock Exchange for the period 2001 to 2008. Results presented evidences that debt level, size and growth rate can affect company's working capital management.

Akinlo (2012) studies the determinants of working capital requirements of 66 firms in Nigeria using panel data for the period 1997-2007. The results suggest that sales growth, firms' operating cycle, economic activity, size and permanent working capital are firm specific characteristics that positively drive working capital policy. Consistent with the Pecking Order Theory, there is a significant negative relationship between leverage and working capital requirements.

Asmawi and Faridah (2012) examine the validity of factors that determine the working capital of 50 Malaysian firms for the period 2006-2008. Using partial least square method, results provide evidences that growth of the firm, profitability, debt, size and industry classification are determinant factors of the firms during the period of study.

Wasiuzzaman and Arumugam (2013) explore the determinants of the level of investment in net operating working capital by firms in Malaysia using data from 192 companies for 2000-2007. The study finds that in times of economic expansion, younger and smaller firms with less tangible assets, low leverage, high immediate sales growth, high operating cash flows less volatile revenues and low levels of asymmetric information are likely to have the highest investments in operating working capital. The study, however, could not find a strong relationship between working capital management and board characteristics (size and the independence of the board).

The present study following Chiou and Cheng (2006) and Nazir and Afza (2009) analyses the various factors that determine the working capital requirements of 30 non-financial firms listed on the floor of the Nigerian Stock Exchange.

3 METHODOLOGY

3.1 Data source

Data for this study were sourced from the various annual financial reports of the firms, Nigerian Stock Exchange and the Central Bank of Nigeria bulletin. The firms cover 14 industrial groups. In all, this study utilizes data from 30 non-financial firms (purposely selected from population of 121 firms) for the 8- year period 2004-2011. This represents 240 firm-year observations.

3.2 Variable description and expectations

Dependent variable: This study utilizes Net working capital deflated by total assets of the firm (NWC_TA) as

only the dependent variable. The deflation is necessary to control for firm size. This is a modified version of the dependent variable as used by Shulman and Cox (1985) and Nazir and Afza (2009).

Independent variable: The study makes use of both firm-specific and economic variables as explanatory variables. In all, 6 firm- specific variables (size, leverage, growth opportunities, return on assets, operating cycle and industry classification) and one economic variable (level of economic activity) are utilized.

The size of a company is considered to be an important determinant of a firm's working capital management. Theoretically, a larger sized firm is expected to have a greater investment in working capital. Thus, a positive relationship is expected between working capital management and size, as shown in the study of Almeida, Campello and Weishbach (2004). On the other hand, a larger sized firm may have better concessions or favourable terms from its suppliers, thus necessitating spending lesser amounts in working capital items. Hence, under this situation, a negative relationship between size and working capital management should be expected.

Following the prediction of Pecking Order Theory (Myers and Majluf, 1984), a negative relationship between leverage and working capital level should be expected. This suggests, according to Nakamura and Palombini (2010), that leveraged companies aim to work with low level of current assets, to avoid issuing new debt and equity securities.

A firm's sales expectation (growth) is also considered to be an important variable of working capital management. Nunn (1981) posits that a firm that anticipates growth in sales is likely to increase the investment in inventories (working capital item). A positive relationship between sales growth and working capital management is expected.

ROA is the variable that is mostly used in empirical studies to proxy financial performance. Following the prediction of the Pecking Order Theory, a negative relationship between ROA and working capital management should be expected. However, Nazir and Afza (2008) posit that since highly profitable firms have the cash to invest in investment activities, they would not be concerned with efficient working capital management. Thus, they submit a positive relationship between ROA and working capital level. Thus, the effect of ROA on working capital requirements can be either positive or negative.

Operating cycle for a firm can be long or short. Ceteris paribus, if it is long, the firm's working capital requirements will be large, and vice versa. Thus, a positive relationship between operating cycle and working capital requirements should be expected.

Level of economic activity is exogenously determined and can affect a firm's working capital requirements. Lamberson (1995) provides evidence that liquidity slightly increased during economic expansion with no noticeable change in liquidity during economic slowdowns. Zariyawati et al (2010) confirm that Malaysian firms' investment in net operating working capital increased with better economic condition.

In their study, Hawawini et al (1986) show that a positive relationship between the level of working capital of the industry and the level of working capital of the company should be found. Filbeck and Krueger (2005) affirm that both significant differences between industries in working capital measure across time and also significant changes in these measures within industries over the time.

The means by which the various variables adopted in this study are computed are as shown in Table 1.

Table 1: Measurement of variables

Variable	Abbreviation	Description
Working capital requirement	NWC_TA	$\frac{\text{Current Assets- Current Liabilities}}{\text{Total Assets}}$
Firm's size	SIZ	Log of Sales
Leverage	LEV	$\frac{\text{Total Debts}}{\text{Total Debts + Total Equity}}$
Growth opportunities	GRW	Change in the natural log of Sales
Level of economic activity	LEA	Change in the natural log of GDP
Industry classification	IND	The dummy variable takes the value 1 if the firm is in that sector; otherwise it takes the value 0.
Return on asset	ROA	$\frac{\text{Profit Before Tax}}{\text{Total Assets}}$
Operating cycle	OC	Inventory Conversion Period (ICP) + Receivables Conversion Period (RCP). Where, ICP = $\frac{\text{Average inventory}}{\text{Annual cost of goods sold}} \times 365$ and RCP = $\frac{\text{Average accounts receivables}}{\text{Annual sales}} \times 365$

Source: Empirical literature with authors' modifications.

3.3 Model

This study adopts with modification the framework used by Shulman and Cox (1985) and Nazir and Afza (2009). Specifically, the model used in this study is as stated below:

$$NWC_{it} = \beta_0 + \beta_1 SIZ_{it} + \beta_2 LEV_{it} + \beta_3 GRW_{it} + \beta_4 LEA_{it} + \beta_5 ROA_{it} + \beta_6 OC_{it} + \beta_7 IND_{it} + e_{it} \quad \text{---- (3.1)}$$

The study adopts a panel methodology (which combines simultaneously time series with cross-sectional data) and the method of estimation is Ordinary Least Squares (OLS).

4 RESULT AND DISCUSSION

4.1 Descriptive statistics

Table 2 presents the descriptive statistics of the variables used in the study.

Table 2: Descriptive statistics

	Mean	Minimum	Maximum	Standard deviation	Skewness	Kurtosis
NWC_TA	0.114	-0.594	0.631	0.211	-0.176	0.253
SIZE	9.936	8.254	11.378	0.823	-0.249	-0.854
LEV	0.241	0.000	0.911	0.252	0.680	-0.817
GRW	0.049	-0.251	0.302	0.078	-0.333	1.559
LEA	0.027	0.000	0.043	0.010	-1.317	2.663
ROA	0.054	-0.192	0.372	0.758	0.536	2.312
OC	179.840	29.110	625.860	121.682	1.464	1.659

Source: Authors' computation

The average Net working capital deflated by total assets, as shown in Table 2 is 0.114, while the leverage is 0.241. This indicates that the sample firms utilized on the average less amount of debt (low leverage), though some firms do not used debt at all as indicated by the minimum debt ratio of 0% and high levered firm has 91.1% debt ratio. The growth rate is about 4.9% on the average, while the ROA is mere 5.4%. The average operating cycle is about 180 days, with maximum of about 626 days. The standard deviation of ROA is about 76%, indicating that profit can deviate from either side by 76%.

4.2 Correlation

Table 3 presents the correlation matrix of the variables used in the study.

Table 3: Pearson's correlation matrix of the variables

	NWC_TA	SIZE	LEV	GRW	LEA	ROA	OC
NWC_TA	1						
SIZE (sig-1 tailed)	0.909* (0.013)	1					
LEV (sig-1 tailed)	-0.320*** (0.000)	0.322*** (0.000)	1				
GRW (sig-1 tailed)	-0.009 (0.886)	0.223*** (0.000)	0.013 (0.841)	1			
LEA (sig-1 tailed)	-0.929* (0.077)	0.807*** (0.000)	0.273*** (0.000)	0.159** (0.014)	1		
ROA (sig-1 tailed)	0.374*** (0.000)	0.278*** (0.000)	-0.320*** (0.000)	0.368*** (0.000)	0.150** (0.020)	1	
OC (sig-1 tailed)	0.431*** (0.000)	0.260*** (0.000)	0.017 (0.717)	-0.009 (0.891)	0.350*** (0.000)	0.017 (0.797)	1

*, **, *** indicate significant at 10%, 5% and 1% levels, respectively.

Source: Authors' computation (2013)

From Table 3 we observe that there is a positive and significant correlation between firm's size and working capital management (NWC_TA) at 10% level. This indicates the larger the size of the firm the larger will be the amount to be invested in working capital items. Predictably, there is a strong negative correlation between leverage and working capital management. This is in accordance with the prediction of the Pecking Order Theory. A negative but insignificant correlation is the result of the correlation between firm's growth rate and working capital management. The level of economic activity is negatively correlated with working capital management at 10% level. The performance measure, ROA is strong and positively correlated with working capital management at 1% level. This indicates that as the firm becomes more profitable, it will require greater investment in working capital items. Lastly, a strong and positive correlation at 1% level exists between Operating cycle and working capital management, indicating that the higher the operating cycle of a firm, the larger will be the amount to be invested in working capital items and vice-versa. ROA has a positive and significant association at 1% with firm's size. This is in accordance with theoretical expectation of both the

Static Trade Off and Pecking Order Theories. ROA also has a significant but negative correlation with leverage at 1%. Many studies on capital structure have confirmed this result, which is also consistent with the prediction of Pecking Order Theory.

The results of the correlation coefficients as indicated in Table 3 alone cannot be used to make inferences. This is because correlation only shows association between variables and not the strength of the relationship. It is in this regard that we prepare the pooled OLS, which is one of the best methods in establishing a test of relationship between independent and explanatory variables.

4.3 Regression results

Table 4 presents the regression results using pooled OLS as estimation technique. It indicates a positive and significant relationship between firm size and working capital requirements at 5% level. This shows that as a firm becomes larger it will require higher investment in working capital items. This outcome is consistent with the findings of Almeida et al (2004), Kieschnick et al (2006), Chiou (2006) and Akinlo (2012).

Leverage is found to be negative and significantly related with working capital management at 1% level. It posits that financial manager can practice efficient working capital management by reducing the firm's debt level so as to avoid unnecessary tying up of capital in accounts receivables and inventories. This outcome is in accordance with the prediction of Pecking Order Theory and find support in the studies conducted by Chiou and Cheng (2006), Nazir and Afza (2009), Deesomsak and Chau (2011), Nakamura and Palombini (2012), Akinlo (2012), Asmawi and Faridah (2012) and Wasiuzzaman et al (2013).

The Table 4 indicates a strong positive and significant relationship at 1% level between ROA and working capital requirements. This is consistent with the findings of Wu (2001), Nazir and Afza (2008) and Wasiuzzaman et al (2013). Is suggests that firms with high profitability can also keep high working capital requirements without any problem whatsoever.

Operating cycle is seen to be positive and significantly related with working capital requirements at 1% level. This indicates that firm with high operating cycle will require high investment in working capital items. To manage a firm's working capital requirements efficiently, will require optimum control of its operating cycle. This outcome has the support of the findings in the studies conducted by Chiou et al (2006), Nazir and Afza (2008), Nazir and Afza (2009), Akinlo (2012) and Wasiuzzaman et al (2013).

Industrial sector classification and working capital requirements are seen to be positively and significantly related in 13 out of the 14 industrial sector classifications, with exception in sector 3 (Breweries). The result is consistent with the findings of Hawawini et al (1986), Nazir and Alfza (2009).

The relationship between working capital requirements and both growth rate and level of economic activities is negative but not significant. This insignificant relationship is also confirmed in the study conducted by Nazir and Alfza (2006), Chiou et al (2006) and Appuhami (2008) but with insignificant positive relationship. It is however in contrast to the finding of Akinlo (2012) which showed both positive and negative relationships regarding level of economic activity for different models used and positive relationship for sales growth.

In the Table 4, we observe that the model as a whole is fit as a result of the F-stat value of 15.340 which is significant at 1% level.

It can be deduced from this study that five factors- firm's size, leverage, ROA, operating cycle and industrial sector classification are the determinants of the sample firms during the period of study.

Table 4: Simple pooled OLS regression results

	NWC_TA
Constant	0.377 (0.707)
SIZE	2.485** (0.014)
LEV	-3.309*** (0.000)
GRW	-1.294 (0.197)
LEA	-0.061 (0.951)
ROA	8.193*** (0.000)
OC	6.782*** (0.000)
IND1	3.269*** (0.001)
IND2	3.425*** (0.001)
IND3	1.309 (0.192)
IND4	2.011** (0.046)
IND5	3.321*** (0.001)
IND6	2.718*** (0.007)
IND7	1.801* (0.073)
IND8	2.054** (0.041)
IND9	2.262** (0.025)
IND10	2.102** (0.037)
IND11	1.883* (0.061)
IND12	2.165** (0.031)
IND13	2.233** (0.027)
IND14	2.264** (0.025)
F-stat	17.074*** (0.000)
Adjusted R^2	0.651
DW	1.980

The p-values are in parentheses. *, **, *** indicate significant at 10%, 5% and 1% respectively.
Source: Authors' computations (2013)

5 CONCLUSION

Working capital represents the proportion of total funds used for the day-to-day running of the affairs of a company. A firm requires an optimum level of working capital in order to avoid problems of having too much or too little investment in it. To determine this optimum level is one of the primary functions of management.

There are both internal and external factors that determine the working capital level of a firm. The present study considers seven of such factors as found in the empirical literature and see whether these factors

are portable to an emergent environment like Nigeria.

Using data for 30 listed non-financial firms in Nigeria for the period 2004-2011, regression results show that five factors- firm's size, leverage, ROA, operating cycle and industrial sector classification are determinants of the sample firms' working capital during the period of study. The implication of this is that financial managers should take cognizance of these factors whenever they want to develop and achieve optimum working capital level for their organisations.

Contrary to expectations, the study could not confirm statistically the importance of two factors- firm's growth rate and level of economic activity as determinant factors of working capital management.

For future line of research, attention should be directed at improving this study by considering larger sample size and increasing the study time frame, to say 15 years. Lastly, by adding some variables that are not tested here, such as inflation, operating cash flow, Tobin's q, corporate governance mechanisms, will produce a more robust result.

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APPENDIX I: SAMPLE FIRMS

SECTOR	NUMBER OF FIRM
1: AGRIC/AGRO-ALLIED	1
2:AUTOMOBILE AND TYRE	1
3: BREWERIES	2
4: HEALTHCARE	2
5: TEXTILE	1
6: INDUSTRIAL AND DOMESTIC PRODUCT	3
7: BUILDING MATERIALS	3
8: CHEMICAL AND PAINTS	3
9: CONGLOMERATES	2
10. CONSTRUCTION	2
11: PRINTING AND PUBLISHING	2
12: FOOD/BEVERAGES & TOBACCO	3
13: PACKAGING	3
14: PETROLEUM (MARKETING)	2
TOTAL	30

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