WORKING CAPITAL MANAGEMENT AND FINANCIAL RETURNS OF LISTED PETROLEUM FIRMS IN NIGERIA

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Abstract

Introduction/Purpose: *Recently, some firms operating in the mainstay of Nigerian economy (petroleum sector) reported negative returns and restated their financial statements. Given this rationale, this study examines the influence of working capital management on the financial returns of petroleum firms in Nigeria.* **Design/Methodology:** *Data related to the study's variables were obtained from the annual reports of nine out of 14 petroleum firms listed on the Nigerian Stock Exchange between 2010 and 2016 using panel regression model.* **Findings:** *The results show that the efficient working capital management pursued by these firms was thwarted by the reversal of the expectation of the average payment period. Specifically, the findings revealed that three of the independent variables, cash-conversion-cycle and two of its components, average-collection-period and inventory-turnover-period, had significant negative impact as hypothesised on the two measures of financial returns, return-on-asset and return-on-sales, adopted for the study while the average-payment-period significantly and negatively influenced the profitability against the expectation. Also, leverage and size negatively and positively influenced these firms' profitability respectively.* **Practical Implications:** *This indicates that a relapse of one of the principles of the efficient working capital management obstructs its actualisation. Thus, petroleum firms should ensure that the cash appropriated from the delayed days of account payables is used for purposes that contribute towards increased profitability. They should also prioritise financing more with equity than debt and expanding the scale of their business.***Originality/Value:** *This study appears foremost to have singled out a study on the liquidity management and performance of firms in the Nigerian petroleum industry.*

Keywords: AveragePayment Period, Cash Conversion Cycle, Financial Returns, Nigeria, Petroleum Firms.

JEL Classification: M41, M21

1. Introduction

Going concern as one of the principles of accounting is as old as accountancy itself. A business is expected to operate without any threat of its activities being curtailed by any externality. For this noble motive to become realistic, an efficient working capital management should be institutionalised as part of the culture of an organisation that allocates high weights to maximising its shareholders' value. Giving all required priorities to the efficient management of working capital (WC) should not be a matter of debate because WC

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is lifeblood of a profit-oriented entity (Butt, 2014). A business organization that is indifferent to profitability and liquidity may find it difficult to survive for a longer period (Ashraf, 2012). Thus, working capital management (WCM) is not only as important as profit but also a forerunner to an enduring profitability of an organisation. What efficient working capital management entails is planning and controlling liquid assets and current liabilities in a manner that eliminates the risk of inability to meet outstanding short term obligations on the one hand, and avoid investing excessively in these assets on the other hand (Eljelly, 2004).

Current assets and liabilities being a central component of an organisation net-worth are centrepiece of ensuring a grand style working capital management. That is why a number of empirical studies have confirmed the relationships between working capital management and level of profitability of a firm (see Raheman & Nasr, 2007; Afza & Nazir, 2008; Mathuva, 2010; Dinku, 2013; Ikpefan & Owolabi, 2014, among others). Using the knowledge of short term assets and liabilities, WCM may be strategically aggressive, conservative or moderate (Meszek & Polewski, 2006). It is aggressive when an organisation maintains a high shorter liabilities level and a low level of current assets in the total assets. A conservative WCM approach is in force when a firm maintains a low short term liability level and a high level of current assets in the total assets. However, a moderate strategy is a mid-way between being aggressive and conservative in WCM by a firm. Thus, the choice of a strategy determines the structure of working capital and its finance. Regardless of the strategy adopted, a working WCM relationship with the firm's profitability must be on the front burner.

Past works in this area (WCM) have compared the relationships between various components of WCM and profitability of a firm with profitability being defined as either 'return on equity' (ROE) and/or 'return on assets' (ROA). These components include average collection period, average payment period, inventory turnover period, cash conversion cycle, current ratio and quick ratio (see Gill, Biger & Mathur, 2010; Alipour, 2011; Ogundipe, Idowu & Ogundipe, 2012; Owolabi & Alu, 2012; Adagye, 2015). In Nigeria, for instance, research on the impact of WCM on profitability based on the industry type has been conducted in the consumer goods, food and beverage goods and manufacturing sector (see Ikpefan & Owolabi, 2014; Osundina, 2014; Salman, Folajin & Oriowo, 2014) and in the banking industry (Adagye, 2015; Umoren & Udo, 2015). Nevertheless, the oil and gas sector remains unexplored. Recently, some petroleum firms face some profitability challenges as obtained from their audited financial reports where negative returns are reported. A negative return which is as high as 3,000 per cent and 50 per cent for net profit margin and ROA respectively was reported by a company. Some giant firms have not only been reporting negative returns but also restating their financial statements over a couple of years. This casts aspersions upon the reputation of the firms in the industry and perhaps threatens their going-concern. Nigeria, being a mono-economy, has proceeds from oil and gas as the mainstay of her economy. Petroleum industry plays a leading role and occupies a strategic position with income from it accounting for more than 80 per cent of Nigeria's total revenue (Akinlo, 2012; Baghebo & Atima, 2013). This is evident that the sector is critical to the success of Nigeria's economy, thereby the need for the concern about the smooth running of companies in the sector with focus on their WCM.

1.1 Research Objectives

This study seeks to examine the extent of the relationship between working capital management and profitability of oil and gas companies in Nigeria given the importance of these firms in its economy. The main object is broken down into the following specifics:

i. To examine the relationship between average collection period and profitability of oil and gas companies in Nigeria;
ii. To determine extent of influence of average payment period on profitability of these companies;
iii. To study the impact of inventory turnover period on profitability of the petroleum firms;
iv. To investigate the effect of cash conversion cycle on the profitability of these firms; and,
v. To relate other factors such as size of these firms and their liquidity with their profitability.

1.2 Research Hypotheses

The objectives set for this study prompted the formulation of the following hypotheses whose test will reveal the existence of the impending relationships or not between the components of WCM and profitability.

H_{01}: Average collection period has a significant negative impact on financial returns of petroleum firms in Nigeria.
H_{02}: Average payment period has no significant influence on profitability of these firms.
H_{03}: The period of stock turnover of these firms significantly and negatively affects their profitability.
H_{04}: Cash conversion cycle has significant negative effect on the profitability of the firms in Nigeria's petroleum industry.

2. Review of Related Literature

This section focuses on reviewing the past works and their empirical findings in the WCM literature both in Nigeria and beyond. The section first examines the conceptual and theoretical background of WCM and subsequently concludes with an empirical review and the identification of gap in the literature.

2.1 Conceptual and Theoretical Framework

Using cash conversion cycle theory of Richards and Laughlin (1980), the relationship between WCM and firms' financial returns is confined to the linkage between cash conversion cycle (CCC) and firms' profitability. The theory actually propounds that the efficient working capital management represented by a short cash conversion cycle will increase a corporate entity's solvency, profitability and value, while inefficient working capital management symbolizing a long CCC will lead to lower profitability and lower firm value. Incontrovertibly, two major types of relationships are identifiable in the WCM-profitability trade-off, inverse and positive relationship (Richards & Laughlin, 1980). On the negative side, it has been empirically demonstrated in the literature that a shorter CCC indicates efficient management of a firm's cash and cash equivalents, because more sales per

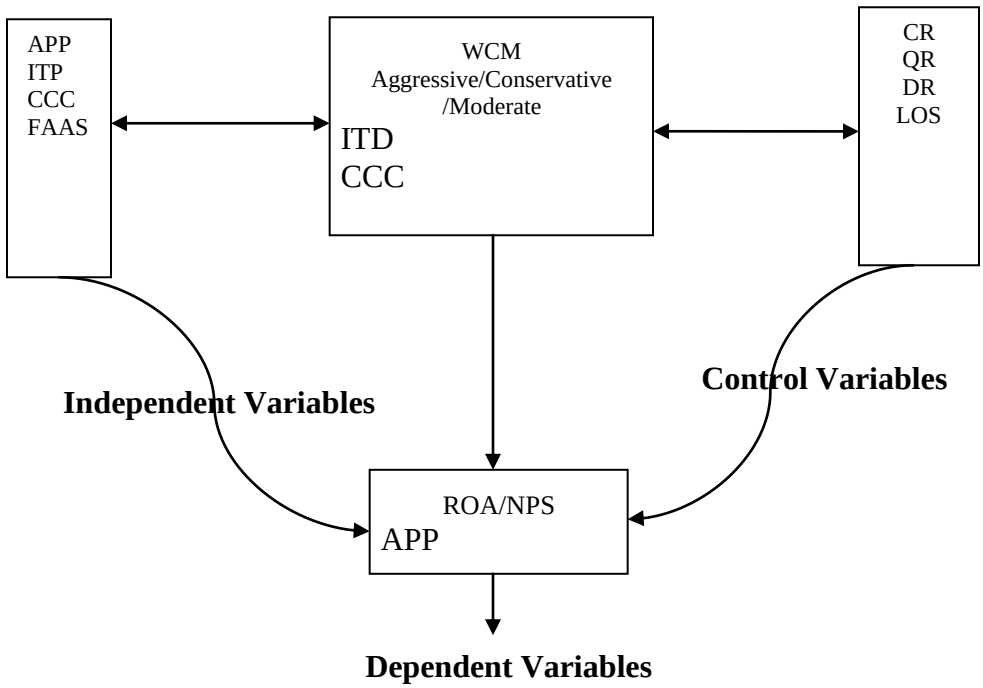
unit of invested capital is attained (Al Debi'e, 2011; Charitou, Elfani & Lois, 2010; Dănuleţiu, 2010; Deloof, 2003; Eljelly, 2004; Iqbal, Ullah, Zhuquan & Shah, 2016; Mohamad & Mohd Saad, 2010; Mathuva, 2010; Oseifuah & Gyekye, 2016; Raheman & Nasr, 2007; Zariyawati, Annuar, Taufiq & AbdulRahim, 2009). Positively, previous studies also empirically provided findings supporting the postulation that longer CCC leads to lower profitability (Adagye, 2015; Afeef, 2011; Anjum, 2013; Gill et al., 2010). The third type is referred to as the concave relationship (Oseifuah & Gyekye, 2016) which is a mid-way between positive and negative relationships. While the focus of the effective WCM centres around the CCC (Iqbal et al., 2016; Oseifuah & Gyekye, 2016), the components of CCC which are average collection period-ACP, average payment period-APP and inventory turnover period-ITP also play significant role in the WCM-profitability relationship (Adam, Quansah & Kawor, 2017; Iqbal et al., 2016; Nuhiu&Dërmaku, 2017).

The average collection period (ACP) represents the length of time it takes the companies to collect proceeds of sales from their debtors (Uremadu, Egbide & Enyi, 2012). Accounts receivable which is the major component of ACP stands for the amount the consumers have to pay to the firm on a current basis and is related to the operating activities (Nuhiu&Dërmaku, 2017). When companies receive the payments from the customers close to the moment on which they deliver the product/service (Nuhiu&Dërmaku, 2017), such companies have more cash to be invested in the business for increased profitability. Thus it is expected that ACP has a negative impact on the financial returns of petroleum firms in Nigeria. The average payment period (APP) is all about the average time taken between purchases of materials and using labour force and cash payments relating to them (Alipour, 2011). Accounts payable, which form the major component of the APP, are short term liabilities or amount payable for purchases made on credit (Iqbal et al., 2016). Companies with efficient WCM have the option of delaying payments to the suppliers most especially when cheap financing is available and then invest the cash and cash equivalents in other activities for higher financial returns (Nuhiu&Dërmaku, 2017). In this case, the prior expectation is positive. The inventory turnover period (ITP) refers to the time taken to convert inventories held in the firm into sales (Mathuva, 2010). The frequency of the number of days inventories are converted into sales reflects in the profitability of a firm (Nuhiu&Dërmaku, 2017). Thus, it should be expected that the ITP negatively affects the company's financial returns.

An important motive ofWCM involves maximising time outflows and inflows of cash and cash equivalents which is known as the cash conversion cycle (CCC). Efforts must be made in any organisation to minimise the time between expenses for getting inventory and cash reception resulted from selling it, because CCC comprehensively measures WCM (Deloof, 2003; Jose, Lancaster, & Stevens, 1996;Oseifuah & Gyekye, 2016). CCC touches all aspects of the business that can ensure its smooth running by being sensitive to the internal resources, cost of external financing, capital market access and the bargaining power with suppliers and customers (Baños-Caballero, García-Teruel & Martínez-Solano, 2010). Since a shorter CCC is a sign of efficient WCM, the impact of CCC on financial returns of petroleum firms in Nigeria is expected to be negative.

The CCC and all its components account for major independent variables in the WCM and profitability literature. Other variables of note, otherwise known as 'control variables' include size of the firm, liquidity, leverage, and financial assets. The company size is usually represented by each company's sales natural logarithm. It is expected that company with more sales should be more profitable. Liquidity is either termed to be current ratio (CR) or quick ratio (QR) while Leverage is defined as debt ratio (DR). The financial assets (FAAS) are described as long and short term investment in stock and bills. In addition, profitability, which is the dependent variable, may be return on assets (ROA) or return on investments (ROI), return on equity (ROE) or return on sales/ratio of net profit to sales (NPS). For this study, ROA and NPS are adopted because ROA, ROE and ROI are more or less similar in definition and that "ROA is a better measure since it relates the profitability of the business to the asset base" (Padachi, 2006, p. 49). Those found to have adopted these variables in their studies are, but not limited to, Dănuleţiu (2010); Gill et al. (2010); Raheman, Afza, Qayyum and Bodla (2010); Afeef (2011); Napompech (2012); Uremadu, et al. (2012); Rehman and Anjum (2013); Ikpefan and Owolabi (2014); Iqbal et al. (2016); and Oseifuah and Gyekye (2016). A model conceptualised from these variables is as presented in the Figure 1.

Figure 1: Conceptual Model



Source: Study's Conceptual and Theoretical Framework

2.2 Empirical Review

Burn and Walker (1991) conducted a survey of working capital policies of 2127 small manufacturing firms in the US and found a statistically significant association between these policies and majority of WCM variables identified. Another US study- Gill et al. (2010) found from a sample of 88 listed firms in the New York Exchange between 2005 and 2007: no significant relationship for APP and ITP with profitability while ACP relationship with profitability was found to be negatively significant with CCC being positively related to profitability. Firm's size and gross operating profit ratio had no significant relationship. In a Belgian study, Deloof (2003) found significant and negative relationships of all indicators of WCM with gross operating income except the CCC whose relationship with profitability was insignificantly negative. Nobanee and Al Hajjar (2009) found for a study conducted for Tokyo Stock Exchange negative and significant relationships except that APP had a positive relationship with profitability measure (ROA). They emphasised the need for lengthening APP. For Mohamad and Mohd Saad (2010) and Al Debi'e (2011), both Malaysian and Jordanian studies respectively, all measures of WCM had significant negative relationships with profitability. The relationship between CCC and profitability was negative as established by Zariyawati et al. (2009). This shows that reducing CCC results in increased profitability. The findings of Afza and Nazir (2007) were that there was a negative relationship between working capital policies and profitability with no significant relationship between the level of current assets and liabilities and risk of the firms. For Alba County companies, Dănuleţiu (2010) empirically found a weak negative linear correlation between WCM indicators and profitability rates.

More so, Raheman and Nasr's (2007) study which sampled 94 Pakistani firms listed on Karachi Stock Exchange found that a strong negative relationship existed between WCM variables and profitability. Their findings further revealed that the control variables of debt ratio and liquidity were significantly negatively related to profitability measure while the positive relationship was established with firm's size. ACP and profitability had a significant negative relationship while ITP and APP were significantly and positively related to profitability measure based on Mathuva's (2010) findings. In a Cyprus study, Charitou's et al. (2010) conclusion was that ITP, APP and CCC were individually inversely related to profitability while ACP had a negative effect on profitability. Alipour (2011) supported his work with statistical evidence that ACP and corporate profitability were significantly negatively related. This also applies to ITP and CCC. However, APP established a direct significant relationship. Charitou, Lois and Santoso (2012) found CCC and net trade cycle to be positively related to the firm's profitability, but debt ratio was found to be negative. Napompech (2012) who based his works on companies listed on the Stock Exchange of Thailand averred that there was a negative relationship between gross operating profits and ITP as well as ACP, while Rehman and Anjum (2013) found from a study on cement sector in Pakistan an inverse and positive association between WCM and ROA with reference to liquidity and inventory management as well as working capital turnover. Another Pakistani study, Iqbal et al. (2016) found for manufacturing firms significant and negative influence of all components of WCM on ROA. The results of these earlier studies agreed with the findings of Oseifuah and Gyekye (2016) for non-financial firms listed on the Johannesburg Stock Exchange except that ACP and APP were not significant.

For the small and medium scale enterprises (SMEs), Afza and Nazir (2008) whose works centred on aggressiveness and conservativeness of working capital policies found a negative relationship between profitability and the degree of aggressiveness of working capital investment and financing policies. Another SMEs study, Afeef (2011), found for the WCM variables: an insignificant and significant negative association of ITP with ROA and NPS respectively; ACP is insignificantly negatively related to ROA but had a significant negative association with NPS; APP was insignificantly negatively associated with both ROA and NPS while CCC has insignificant positive relationship with ROA but its association with NPS was insignificantly negative; for liquidity (CR), the relationship was insignificantly positive with ROA but negatively significant with NPS. Dinku (2013) Ethiopian micro and medium enterprises' study empirically revealed a strong positive relationship between ACP and enterprise profitability while the APP, ITP and CCC showed a strong negative relationship.

In Nigeria, Ogundipe et al. (2012) findings revealed a significant negative relationship between CCC and market valuation as well as firm's performance of Non-Financial firms. Although a negative relationship was found between debt ratio and market valuation, its relationship with firm's performance is negative. Uremadu et al. (2012) found a positive effect of ITP and ACP while a negative effect was found for CCC and APP on profitability measures (ROA). Overall, the study found CCC to be most significant precision variable in influencing profits. Consequent upon a study of a sample of 5 selected manufacturing firms in Nigeria Owolabi and Alu (2012) found that each working capital component affects the company's level of profitability at varying rates but when pooled together the effects are not significant. Osundina (2014) findings revealed a relatively strong positive and significant relationship between WCM and net operating profit and a positive but insignificant relationship between CCC and net operating profit of Food and Beverage manufacturing firms in Nigeria. Ikpefan and Owolabi (2014) who studied two Nigerian conglomerates concluded that there is a negative relationship between liquidity, two of the efficiency ratios and return on equity (ROE) for Nestle Nigeria Plc while a positive relationship was found between the liquidity, efficiency ratios and return on equity (ROE) of Cadbury Nigeria Plc. A recent work of Imeokparia (2015) found for Food and Beverage Industry in Nigeria a positive relationship of WCM with efficiency and liquidity of the firms while a negative relationship was found with profitability. Also recently, Adagye (2015) found from WCM study of Nigerian deposit money banks (DMBs) that the two profitability proxies (ROA and ROE) are positively affected by all the elements of WCM. A similar banking study by Umoren and Udo (2015) with bank-specific data of 10 Nigerian DMBs between 2012 and 2014 disagreed with Adagye (2015) by establishing that all the components of WCM negatively influenced ROE with only CCC being significant.

Evidence from the previous studies has shown the extent of the research inputs made in the WCM literature. Notwithstanding past works based on industry type have not hitherto singled out a study with focus on oil and gas industry most especially in Nigeria despite being critical to her economy. This accentuates the uniqueness of this study and its contribution to knowledge.

3. Research Methodology

WCM and profitability express a relationship which is between measures of profitability and the indicators of WCM. Prominent among the methods of statistical analysis for expressing an association are regression and correlation. These two methods have been found very useful in the WCM literature (Deloof, 2003; Iqbal et al., 2016; Oseifuah & Gyekye, 2016). The association between profitability and WCM reveals the relationship between a proxy of profitability and a number of measures of WCM. Thus, a multiple regression or multivariate analysis will be appropriate in this regard. A multiple regression model is described by Anderson, Sweeney and Williams (2011) as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_n X_n + \varepsilon \quad \text{(i)}$$

Where β_0, β_1, β_2... β_n, are the parameters and ε stands for the error term.

Where time series data relating to a number of firms (panel data) are involved, the equation becomes:

$$Y_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 X_{it} + ... + \beta_n X_{it} + \varepsilon_{it} \quad \text{(ii)}$$

In the model (ii):

Y_{it} = Dependent variable of firm i at time t

X_{it} = Different independent variables / control variables of firm i at time t

When the model (ii) is transformed into the present study to suit its purpose, this is arrived at:

$$PROF_{it} = \beta_0 + \beta_1 ACP_{it} + \beta_2 APP_{it} + \beta_3 ITP_{it} + \beta_4 CCC_{it} + \beta_5 CR_{it} + \beta_6 QR_{it} + \beta_7 DR_{it} + \beta_8 LOS_{it} + \varepsilon_{it} \quad \text{(iii)}$$

In the model (iii), $PROF_{it}$ stands for measure of financial return of firm i at time t. The indicators of a firm's financial returns adopted for this study are return on assets (ROA) and ratio of Net Profit to Sales (NPS). Consequently, these two equations are deduced:

$$ROA_{it} = \beta_0 + \beta_1 ACP_{it} + \beta_2 APP_{it} + \beta_3 ITP_{it} + \beta_4 CCC_{it} + \beta_5 CR_{it} + \beta_6 QR_{it} + \beta 7 DRit + \beta_8 LOS_{it} + \varepsilon_{it} \quad \text{(iv)}$$

$$NPS_{it} = \beta_0 + \beta_1 ACP_{it} + \beta_2 APP_{it} + \beta_3 ITP_{it} + \beta_4 CCC_{it} + \beta_5 CR_{it} + \beta_6 QR_{it} + \beta_7 DR_{it} + \beta_8 LOS_{it} + \varepsilon_{it} \quad \text{(v)}$$

Based on the study's hypotheses and the fact that ACP, ITP and APP are components of CCC, all the four variables are not incorporated into a model concurrently. Each independent variable is incorporated into a model alongside with other control variables at a point in time. This transforms into four models based on each dependent variable which amounts to eight models in all.

When ROA is the dependent variable, the following models are deduced:

$$ROA_{it} = \beta_0 + \beta_1 ACP_{it} + \beta_2 CR_{it} + \beta_3 DR_{it} + \beta_4 LOS_{it} + \varepsilon_{it} \quad \text{(vi)}$$

$$ROA_{it} = \beta_0 + \beta_1 APP_{it} + \beta_2 CR_{it} + \beta_3 DR_{it} + \beta_4 LOS_{it} + \varepsilon_{it} \quad \text{(vii)}$$

$$ROA_{it} = \beta_0 + \beta_1 ITP_{it} + \beta_2 QR_{it} + \beta_3 DR_{it} + \beta_4 LOS_{it} + \varepsilon_{it} \quad \text{(viii)}$$

$$ROA_{it} = \beta_0 + \beta_1 CCC_{it} + \beta_2 CR_{it} + \beta_3 DR_{it} + \beta_4 LOS_{it} + \varepsilon_{it} \quad \text{(ix)}$$

When NPS is the dependent variable, the following four models are deduced:

$$NPS_{it} = \beta_0 + \beta_1 ACP_{it} + \beta_2 CR_{it} + \beta_3 DR_{it} + \beta_4 LOS_{it} + \varepsilon_{it} \quad \text{(x)}$$

$$NPS_{it} = \beta_0 + \beta_1 APP_{it} + \beta_2 CR_{it} + \beta_3 DR_{it} + \beta_4 LOS_{it} + \varepsilon_{it} \quad \text{(xi)}$$

$$NPS_{it} = \beta_0 + \beta_1 ITP_{it} + \beta_2 QR_{it} + \beta_3 DR_{it} + \beta_4 LOS_{it} + \varepsilon_{it} \quad \text{(xii)}$$

$$NPS_{it} = \beta_0 + \beta_1 CCC_{it} + \beta_2 CR_{it} + \beta_3 DR_{it} + \beta_4 LOS_{it} + \varepsilon_{it} \quad \text{(xiii)}$$

It is observable that QR and CR are not used together in a model; this is due to the high correlation between them which is an indication of multi-collinearity (see Table 3).

Thus, QR is included in a model where ITP is the independent variable because the major component of ITP is inventory while QR excludes inventory.

The descriptions of all the variables of the study are presented in Table 1.

Table 1: Description of all variables of the Study

S/N	Variable	Variable Type	Measurement	Expected Sign of Explanatory Variable
1	Return on Asset (ROA)	Dependent	Net income before interest and tax scaled by total assets	
2	Return on Sales (NPS)	Dependent	Operating profit scaled by sales	
3	Average Collection Period (ACP)	Independent	Average trade receivables scaled by total sales multiplied by 365 days	-
4	Average Payment Period (APP)	Independent	Average trade payables scaled by cost of sales multiplied by 365 days	+
5	Inventories Turnover Period (ITP)	Independent	Average inventories scaled by cost of sales multiplied by 365 days	-
6	Cash Conversion Cycle (CCC)	Independent	The difference between APP and the sum of ACP and ITP	-
7	Current Ratio (CR)	Control	Current assets divided by current Liabilities	?
8	Quick Ratio (QR)	Control	Current assets less inventories scaled by current liabilities	?
9	Debt Ratio (DR)	Control	Sum of long-term and short-term debts scaled by total assets	-
10	Size (LOS)	Control	Natural logarithm of Sales	+

Source: Authors' compilation, 2017

The information related to the variables was obtained from the annual reports of the companies in the oil and gas industry being studied. There were 14 oil and gas companies listed on the Nigeria Stock Exchange (NSE) as at July 2017 when data were being obtained. The financial records and annual reports of a number of these firms could not be accessed both on the NSE and individual companies' websites. The rationale for this might be: suspension, issues with Assets Management Corporation of Nigeria (AMCON), and failure in the 'X-Compliance Report' of the NSE. The failure of these companies in this regard are in form of falling short of the minimum listing standards; operating below the listing standards (BLS) and being slated for delisting/restructuring. Given this, data were obtained from nine companies with sufficient financial records within the accounting periods being reviewed, that is, 2010-2016. Based on this rationale, the study projected to have a balanced panel data set of 63 firm-year observations but for missing annual reports of some of the selected

companies, an unbalanced panel data set of 58 firm-year observations was eventually used for the analysis.

Data were analysed both descriptively and inferentially. The descriptive statistics used are mean, standard deviation, minimum and maximum values. The essence of correlation is to establish pair-wise relationship between all the variables of the study with a view to determining the extent of multi-collinearity among them. The regression analysis seeks to determine the influence of all measures of WCM and other variables on the financial returns of petroleum firms in Nigeria.

4. Results and Discussion

This section presents the results of the analysis of the data and their interpretations. The results of the descriptive statistics are first presented, followed by Pearson's correlation and panel data regression estimates including other attendant tests.

4.1 Descriptive Statistics

The results of descriptive statistics of all variables of the study are presented in Table 2. It is evident in Table 2 that the average ROA of the sampled oil firms within the sample period is positive, that is, 0.07. This means that the firms are profitable in the periods under study. The ROA is as high as 0.37 but a minimum value of 50% loss is a source of concern to the players in the industry. The situation of profit margin is worse as the petroleum firms averagely were not profitable in the sampled period. The NPS negative minimum value of 3000% is indeed a bad omen. Worse still, the extent of the risk attached to these two variables manifest in the values of their standard deviation which are higher than their mean. The average collection period (ACP) ranges between minimum of 2 days and maximum of 217 days with an average of 43 days. This shows that it took the sampled firms an average of 43 days to collect debts from their customers. However, a standard deviation of 46 days reveals that there is higher variation of accounts receivable among the sampled oil firms.

For accounts payable, it takes the sampled firms 61 days to settle debts owed to their suppliers/creditors, and that the firms' accounts payable have close variation with a standard deviation of 60 days. The inventories are turned over every 29 days on average but higher variation exists in the sampled firms' ITP with a standard deviation of 42 days. With a minimum value of 0, some firms do not have inventories but a maximum value of 317 days is suggestive of low sales among the sampled firms. The CCC ranges from -141 days minimum to 168 days maximum. On the average, it takes an average of 11 days to convert inventories into goods for sale and debts owed by customers into cash. This is an indication of quick collection from debtors and delayed payments to suppliers, but there is higher variation in CCC among sampled firms with a standard deviation of 46 days. The CR and QR are averaged 1.36 and 1.19, respectively with a close variation of 1.2. Although debt ratio is averaged 0.7, it has a low variation of 0.19 among sampled firms.

Table 2 : Descriptive Statistics of all Variables of the Study

Variable	Observation	Mean	Std. Dev.	Min	Max
ROA	58	0.07	0.12	-0.50	0.37
NPS	58	-0.47	3.99	-30.33	0.55
ACP	58	43.05	45.93	1.6	217.39
APP	58	61.42	59.77	0.45	297.10
ITP	58	29.45	42.59	0.00	316.87
CCC	58	10.98	45.75	-140.53	167.62
CR	58	1.36	1.20	0.29	7.19
QR	58	1.19	1.24	0.29	7.16
DR	58	0.72	0.19	0.11	1.38
LOS	58	18.20	1.31	13.38	20.29

Source: Authors' computation, 2017, based on Stata version 14 outputs

4.2 Pearson's Correlation Matrix

The correlation matrix presented in Table 3 seeks to determine the nature of the relationships among the study's variables and identify whether there are issues of multi-collinearity. Based on the evidence from Table 3, three of the independent variables- ACP, APP and ITP have significant negative relationships with both measures of financial returns, ROA and NPS. For these three variables, the higher each of them is, the lower the ROA and NPS of petroleum firms in Nigeria for the sampled periods. The CCC is insignificantly but positively related to ROA and NPS in a pair-wise correlation. Regarding the multi-collinearity, high correlation is not noticeable among the explanatory variables except between CR and QR where the correlation co-efficient is very close to unitary that is as high as 0.9955. This is adequately attended to by ensuring that both variables are not together in a model. Other variables with significant relationship with measure of profitability are leverage (DR) which is negative and size (LOS) which is positive. These results are in agreement with the prior expectations.

Table 3 : Correlation Matrix of all Variables of the Study

Variable	ROA	NPS	ACP	APP	ITP	CCC	CR	QR	DR	LOS
ROA	1.0000									
NPS	0.6638	1.0000								
	(0.0000)*									
ACP	-0.5593	-0.5129	1.0000							
	(0.0000)*	(0.0000)*								
APP	-0.4606	-0.3837	0.5928	1.0000						
	(0.0003)*	(0.0029)*	(0.0000)*							
ITP	-0.0029	0.0736	0.1297	0.5215	1.0000					
	(0.9826)	(0.5830)	(0.3319)	(0.0000)*						
CCC	0.0375	0.0547	0.3501	-0.2261	0.3794	1.0000				
	(0.7801)	(0.6833)	(0.0071)*	(0.0879)***	(0.0033)*					
CR	-0.0702	0.0279	0.4167	0.0678	0.0811	0.4062	1.0000			
	(0.6003)	(0.8356)	(0.0031)*	(0.6129)	(0.5499)	(0.0016)*				
QR	-0.1003	0.0098	0.4573	0.0859	0.0566	0.4006	0.9955	1.0000		
	(0.4539)	(0.9419)	(0.0003)*	(0.5213)	(0.6728)	(0.0018)*	(0.0000)*			
DR	-0.3282	-0.4664	-0.0465	0.1682	-0.2031	-0.457	-0.7485	-0.7357	1.0000	
	(0.0119)**	(0.0002)*	(0.7291)	(0.2070)	(0.1262)	(0.0003)*	(0.0000)*	(0.0000)*		
LOS	0.3726	0.4922	-0.659	-0.1489	0.1456	-0.3328	-0.5414	-0.5593	0.1999	1.0000
	(0.0040)*	(0.0001)*	(0.0000)*	(0.2647)	(0.2755)	(0.0107)**	(0.0000)*	(0.0000)*	(0.1324)	

Source: Authors' computation, 2017, based on Stata version 14 outputs where *, ** and *** stand for significance at 1%, 5% and 10%, respectively.

4.3 Panel Data Regression Results

The results of panel data regression model are presented in the Tables 4 and 5 with respect to both dependent variables of the study. From Table 4, the results show random-effects model of panel data regression was adopted for all models except the model with CCC as independent variable based on the results of Hausman tests. Under the Hausman test, the null hypothesis is that, random-effects model is preferred, while the alternative hypothesis is that; fixed-effects model is preferred. This means that when the $p<0.05$, the fixed-effects model is better otherwise random-effects model was opted for. With the model having CCC as independent variable revealing the significant Hausman test result, the fixed-effects model was adopted while random-effects model was adopted for other models. For the presence of heteroscedasticity, given the significant results of tests of heteroscedasticity for all models, robust standard error approach was adopted for all models except the model with CCC where cluster robust standard error approach was adopted to neutralize the problems of the presence of both heteroscedasticity and autocorrelation. Although the adjusted R^2 of all the models with ROA as the dependent variable appears to be low (<0.5), the significant results of Wald statistics and F-statistics are indicative of their appropriateness.

For regression estimates, results show that all the components of WCM have significant negative impact on the ROA as a measure of financial returns. This means that the increase in the number of days of each of the debt collection, debt payment, inventories turnover and cash conversion leads to the decrease in the financial returns (ROA) or vice versa of the petroleum firms in Nigeria for the sampled periods. The measures of liquidity, CR and QR, negatively influenced the ROA except that CR was not significant in a model with APP as independent variable. Similar results were obtained for leverage where its measure, DR, significantly and negatively affected the ROA. These results suggest that the higher the leverage ratio the lower the profitability of petroleum firms in Nigeria. For size (LOS), mixed results were obtained. While the impact of LOS on ROA was positive in models with APP, ITP and CCC but not significant with CCC, its negative influence on ROA was not significant in a model with ACP. These findings, most especially regarding the impact of WCM components, substantially agree with the findings of Raheman and Nasr (2007), Mohamad and Mohd Saad (2010), Al Debi'e (2011), Iqbal et al. (2016) and Oseifuah and Gyekye (2016) but disagree with the findings of Dinku (2013), Rehman and Anjum (2013) and Osundina (2014).

Table 4 : Regression Estimates with ROA as a Measure of Financial Returns

Variable	Model I	Model II	Model III	Model IV
ACP	-0.0015(-3.00)*	……	……..	……...
APP	…….	-0.0007(-3.64)*	…….	……..
ITP	…….	…….	-0.001(-8.90)*	……..
CCC	…….	…….	…….	-0.0004(-3.63)*
CR	-0.0079(-2.05)**	-0.022(-1.14)	…….	-0.0369(-2.41)**
QR	……..	……	-0.0376(-3.38)*	
DR	-0.2807(-2.86)*	-0.2863(-2.79)*	-0.4502(-4.53)*	-0.3987(-2.26)**
LOS	-0.0049(-0.23)	0.0299(1.89)**	0.0346(1.67)***	0.0456(1.39)
Cons.	0.4506(1.19)	-0.1973(-0.59)	-0.1635(-0.40)	-0.4187(-0.59)
Adj.R^2	0.3458	0.3435	0.1553	0.3896
HausM	0.83(0.9338)	0.43(0.9800)	5.31(0.2572)	37.31(0.0001)**
Heter.	17929.99(0.0000)**	11115.16(0.0000)**	28874.52(0.0000)**	2.1e+05(0.0000)**
WaldT/F	108.12(0.0000)**	50.28(0.0000)**	142.2(0.0000)**	86.82(0.0000)**
AutoC	2.084(0.1869)	4.257(0.0730)	3.934(0.0826)	6.328(0.0361)**

Source: Authors' computation, 2017, based on Stata version 14 outputs. Coefficients and z/t values are reported with z/t values in parentheses where *, ** and *** stand for significance at 1%, 5% and 10% respectively. Hausman tests (HausM), test of heteroscedasticity (Heter.) and Wald statistics (WaldT) report chi-square values while tests of autocorrelation (AutoC) and F-statistics report F-values with p-values in parentheses.

Table 5 : Regression Estimates with NPS as a Measure of Financial Returns

Variable	Model I	Model II	Model III	Model IV
ACP	-0.0178(-1.72)***	……	……	……
APP	……	-0.012(-2.01)**	……	……
ITP	……	……	-0.0141(-1.88)***	……
CCC	……	……	……	-0.0026(-0.19)
CR	-0.6933(-1.25)	-0.7225(-1.34)	……	-0.9877(-2.05)**
QR	……	……	-0.9558(-1.89)***	……
DR	-14.71(-4.93)*	-14.44(-4.88)*	-16.9555(-2.32)**	-16.5603(-1.90)***
LOS	1.1773(3.12)*	1.48(4.54)*	1.5576(3.24)*	1.4653(3.69)*
Cons.	-9.6801(-1.19)	-15.43(-2.05)**	-15.1443(-2.24)**	-13.9334(-2.05)**
Adj.R^2	0.9292	0.8659	0.8241	0.8630
HausM	1.49(0.8283)	1.56(0.8166)	2.97(0.5628)	2.56(0.6331)
Heter.	13951.89(0.0000)**	10140.03(0.0000)**	11211.34(0.0000)**	5112.12(0.0000)**
WaldT	86.46(0.0000)**	89.19(0.0000)**	79.04(0.0000)**	47.02(0.0000)**
AutoC	0.484(0.5065)	0.601(0.4605)	0.442(0.5251)	0.425(0.5327)

Source: Authors' computation, 2017, based on Stata version 14 outputs. Coefficients and z values are reported with z values in parentheses where *, ** and *** stand for significance at 1%, 5% and 10%, respectively. Hausman tests (HausM), test of heteroscedasticity (Heter.) and Wald statistics (WaldT) report chi-square values, while tests of autocorrelation (AutoC) report F-values with p-values in parentheses.

From Table 5, statistical evidence shows that the random-effects model is appropriate for models with returns on sales (NPS) as the dependent variable based on the insignificant results obtained from the Hausman tests. Like all the models with ROA, robust standard error approach was adopted given the presence of heteroscedasticity. However, none of the models had the problem of autocorrelation. Although the results of Wald-statistics showed that the models with NPS were appropriate like the models with ROA, the results of adjusted R^2 further revealed that the changes in NPS compared to ROA were better explained by the WCM components and other variables with adjusted R^2>0.8. Like their impact on ROA, each of the components of WCM negatively influenced the Nigerian petroleum firms' financial returns measured by NPS except that CCC was not significant. This represents an inverse relationship between WCM components and NPS. Thus, as the number of days of each of the WCM components was on the increase, returns on sales (NPS) followed a downward trend or vice versa. For liquidity, similar results were obtained regarding the impact of CR and QR on NPS like ROA but significant with models with ITP and CCC. The leverage (DR) maintained

similar results with significant negative impact on NPS in all models. The size (LOS) was also significant with positive influence on NPS in all models. The negative co-efficient of all the intercepts showed the significance of all explanatory variables without which the NPS would be negative. With the significant negative influence of all WCM variables on NPS with the exception of CCC, these findings substantially agree with the findings of Deloof (2003). Other than the CCC that was insignificant, these results are also in agreement with the findings of Raheman and Nasr (2007), Mohamad and Mohd Saad (2010), Al Debi'e (2011), Iqbal et al. (2016) and Oseifuah and Gyekye (2016).

5. Conclusion and Recommendations

The sustainability of the firms in the petroleum industry is not unconnected with the stability of the drivers of the Nigerian economy. This laudable objective accounts for the need to examine the working capital management practice and financial returns of the listed oil and gas firms in Nigeria. With the ROA and NPS as dependent variables and the CCC and its components as independent variables using majorly the random-effects model of the panel data regression based on the firm-specific data obtained from annual reports and accounts of nine listed petroleum firms between 2010 and 2016, a short cash conversion cycle (CCC) was found but distorted with the negativity of the number of days of the accounts payables. This led to the retention and rejection of three hypotheses and one hypothesis, respectively. The hypotheses regarding the ACP, ITP and CCC were retained while the hypothesis regarding APP was rejected.

Though a short CCC symbolises efficient WCM as propounded by Richards and Laughlin (1980), the situation in the Nigerian petroleum industry within sampled periods does not substantially comply with the efficient WCM hypothesis of the CCC theory because of the negative influence of APP on the Nigerian petroleum firms' financial returns. This suggests that the efficient WCM hypothesis is not achievable if any of the components of CCC is distorted. While the negative impact of ACP, ITP and CCC has the potential of improving the profitability of a firm, the negative influence of APP which is inversely related to the profitability conversely has the potential of subverting the efficient WCM hypothesis. Therefore, it is evident that Nigerian petroleum firms have not used delayed days of accounts payable against the quicker days of accounts receivable, inventories turnover and cash conversion noticeable in their financial records (see Table 2) for increased profitability. It can also be inferred from the findings of this study that the increased leverage of a firm by means of increased debt ratio has negative impact on its financial returns while increased scale of a business guarantees improved level of profitability. There is also no empirical evidence to show that the liquidity of the Nigerian petroleum firms brings about their increased profitability based on the impact of CR and QR on their financial returns. This might not be unconnected with the fact that the cash and cash equivalents are tied down without being used for productive activities that will bring about increased profitability.

These results suggest that Nigerian petroleum firms have a lot to do to improve their profitability. These firms are advised to work towards the reality of efficient WCM by ensuring that cash appropriated from the delay of number days of account payables is used for purposes that contribute towards increased profitability. Though their results are

favourable to the efficient WCM hypothesis, these firms should consider reducing further the number of days of account receivable, inventory conversion and cash conversion. The need to finance more with equity than debt should be prioritised while expanding the scale (size) of their business should not be left out. Since the unquoted firms whose accounting information is not in the public domain are in considerable number in the petroleum industry, future studies should source for their information and incorporate both listed and unlisted petroleum firms in order to have more robust findings.

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