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The significance of working capital management in determining firm profitability: Evidence from developing economies in Africa



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ABSTRACT

Purpose: The purpose of this study is to examine the relationship between working capital efficiency and corporate profitability and in particular, to determine their significance across countries with differential industrial levels.

Design: The paper adopts a quantitative approach using balanced panel data of manufacturing firms in Egypt, Kenya, Nigeria and South Africa. We accessed financial statements of manufacturing firms from the Orbis database for the period 2005–2009. The database is known to be reliable and has universal acceptability.

Findings: The study reveals that there is a strong negative relationship between profitability, measured through net operating profit, and cash conversion cycles across different industrialisation typologies. The negative association implies that, when the cash conversion cycle increases, the profitability of the firm declines.

Practical implications: Managers can create positive value for shareholders by reducing the days customers settle their accounts, ensuring that they sell off their inventories as quickly as possible and delaying the payments to their suppliers, as long as this does not affect their credit rating.

Originality: To the best of our knowledge, this is the first paper to provide a fresh perspective on how working capital management influences profitability across Africa within different typologies.

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1. Introduction

The importance of working capital has been investigated from different perspectives in previous studies. For instance, there are those which have investigated the impact of optimal inventory management and those which have examined the best way of managing accounts receivable in order to maximise profitability. Recently [Haq et al. \(2011\)](#) noted that working capital management directly affects the profitability of a firm. This implies that working capital management is one of the fundamental decisions that a finance manager makes.

The objective of working capital management is to ensure that the firm is able to meet its operating expenses and also remain in a position to pay short-term obligations as and when they fall due. The mismanagement of working capital may lead to a liquidity crisis and a reduction in profitability, hence affecting the ability of the firm to continue to operate as a going concern.

Firms manage working capital using three approaches: conservative, aggressive and moderate. The conservative approach is where a firm tends to use mostly long-term sources of finance for its operations and use short-term sources in urgent circumstances. On the other hand, the aggressive approach is having fewer current assets – for example, cash, inventories and trade receivables in proportion of total assets. This may lead to illiquidity ([Van Horne and Wachowicz, 2004](#)). A moderate approach trends between the aggressive and conservative approaches. A moderate approach makes a distinction between fluctuating current assets and permanent current assets with the suggestion that short-term sources of finance should be used to finance fluctuating current assets. Likewise, long-term source of finance should be used to finance permanent current assets.

However, it is important to note that working capital management policies need to consider the nature of the company because different businesses will have different working capital requirements. For instance, manufacturing firms need to invest heavily in spare parts and components, while food retailers will need to have large inventories of goods for resale but will have few trade receivables. Nevertheless, firms may focus on increasing sales by offering trade credit to their customers. While this may increase the stock turnover, it may lead to cash flow problems because some accounts receivables may take a longer time to be settled. On the other hand, while there is an increase in credit sales, a firm may also be required to finance its operations through credit and hence an increase in accounts payable. Having sufficient inventory ensures that a firm does not run out of stock. However, this may lead to incurring extra cost of storage and also some inventory going bad or getting stolen. In addition, apart from tying capital in terms of excess inventories, if a firm takes a longer time to pay its creditors, then its credit rating may be affected and the suppliers may withhold their goods. Therefore it is important that accounts payable, accounts receivable and inventory turnover are maintained at a certain level which may be enhanced by efficient monitoring.

In this context, it is implied that working capital management plays a significant role in the overall corporate strategy of maximising shareholders' value. Maximising shareholders' value encompasses determining the composition and the level of current assets and the level and sources of short-term finance ([Nwankwo and Osho, 2010](#)). In addition, [Alshubiri \(2011\)](#) notes that, during unexpected economic changes, firms that efficiently manage their working capital are likely to react quickly. This requires that firms constantly monitor the level of inventories, accounts receivable and payable.

Therefore the objective of this paper is to examine the impact of accounts receivable, inventories days, accounts payable and cash conversion cycles on net operating profit of a firm. We used, firm size, gross domestic product growth and size of the board of directors as control variables. The rest of this paper is structured as: Section 2 reviews the previous literature, Section 3 examines the data and the methodology for the current research, Section 4 presents results from the data analysis, Section 5 in on the multiple regression analysis results, and Section 6 concludes.

2. Literature review

The most popular way of measuring working capital is the cash conversion cycle (CCC). The CCC is the number of days between the expenditure of the firm's cash for the purchase of raw materials to produce the goods (products) for sale, and the collection of cash from the sale of the finished product ([Sathyamoorthi and Wally-Dima, 2008](#)). Efficient cash management by the firm may increase the

net present value of the cash flows and eventually a shorter CCC period which may result in higher profitability. In other words, a shorter CCC means reduced inventory days, reduced receivable days and reduced payable days.

Filbeck and Krueger (2005) highlighted the significance of efficient working capital management by analysing the working capital management policies of 32 non-financial industries in the United States (US). According to their findings, significant differences in working capital practices exist among industries over time. Moreover, these working capital practices change significantly within industries over time. Similar studies with similar findings were conducted by Long et al. (1993) and Maxwell et al. (1998).

Smith and Begemann (1997) noted that the salient goal of working capital management is striking a balance between profitability and liquidity. The problem arose because the maximisation of a firm's returns could seriously threaten its liquidity, and the pursuit of liquidity had a tendency to dilute returns. This study examined the relationship between traditional and alternative working capital measures and return on investment (ROI) as a proxy for profitability, specifically in industrial firms listed on the Johannesburg Stock Exchange (JSE). The problem under investigation was to establish whether the more recently developed alternative working capital concepts showed improvement associated with the return on investment to that of traditional working capital ratios. Results indicated that there were no significant differences amongst the years with respect to the independent variables. The results of their stepwise regression corroborated that total current liabilities divided by funds flow accounted for most of the variability in ROI. The statistical test results showed that a traditional working capital leverage ratio – current liabilities divided by funds flow – displayed the greatest associations with return on investment. Well-known liquidity concepts such as the current and quick ratios registered insignificant associations whilst only one of the newer working capital concepts, the comprehensive liquidity index, indicated significant associations with return on investment.

Deloof (2003) examined 1009 non-financial firms in Belgium from 1992 to 1996 using CCC as a measure of working capital to investigate the association between profitability and working capital. He measured CCC as accounts receivable days plus inventory days and then subtracted accounts payable and profitability as gross operating income. He found that there was a significant negative association between gross operating income and accounts receivable days, inventory days and accounts payable days. Although he used only large firms, the conclusion was that reducing the accounts receivable days and inventory days to a reasonable level may help improve shareholders' value. The negative association between accounts payable and profitability is in line with the view that more profitable firms wait longer to settle their bills.

Ghosh and Maji (2003) investigated the efficiency of working capital management of Indian cement firms during 1992–1993 and 2001–2002. In order to measure the efficiency of working capital, performance utilisation and overall efficiency, indices were calculated instead of using some common working capital management ratios. Setting industry norms as target efficiency levels for the individual firms, this study also tested the speed of achieving that target level of efficiency. The findings indicated that Indian cement companies did not perform well during that period.

Shin and Soenen (1998) used the net trade cycle (NTC), which is CCC expressed as a percentage of sales. Employing the use of correlation and regression analysis using 58,985 firms from 1975 to 1994, they investigated the relationship between NTC and profitability. They found that there was a strong association between NTC and profitability and suggested that firms may reduce the NTC in order to improve shareholder value.

Raheman and Nasr (2007) investigated the relationship between working capital and profitability using 94 Pakistani firms. They examined the effect of average collection period, inventory turnover and average payment period and CCC on the firms' profitability. They found that there is a negative relationship between working capital and profitability. They concluded that a firm's profitability is largely affected by its CCC.

Gill et al. (2010) used 88 US firms from 2005 to 2007 to find the relationship between working capital management and profitability. They measured profitability by the use of operating profit in order to associate working capital management to either success or failure. Using generalised least square regression methods, they found that there is a significant association between CCC and profitability. Although they considered their sample to be small, they concluded that managers can

improve profitability by reducing the credit period granted to their customers. This is to ensure that a firm has sufficient cash to finance its operation, which is in line with the argument by [Moussawi et al. \(2006\)](#) when they examined the working capital management and the consequences. They concluded that there is a strong relationship between CCC and cash sufficiency.

[Mohammad \(2011\)](#) also examined the association between working capital management and corporate profitability in Iranian industrial firms between 2001 and 2006. Using variables on CCC as independent variables and gross operating profit as a dependent variable, he found that there is a significant negative relationship between average collection period and profitability. Likewise, the association between inventory turnover days and profitability was found to be significant. This implies that firms should decrease the CCC in order to improve profitability since the longer the CCC, the greater the firm's need to look for ways of financing its operations.

[Mona \(2012\)](#) investigated the impact of aggressive and conservative policies on 57 Jordanian firms' profitability and value between 2001 and 2009. Measuring conservative policy as the level of current assets relative to total assets, he found the ratio to be 0.49 and the regression method of estimation indicates that this affects a firm's profitability and value positively. On the other hand, those firms that follow an aggressive investment policy using long-term investment have a negative effect on firm profitability and value. Although their sample size was small, similar findings were found by [Afza and Nazir \(2007\)](#). They investigated the relationship between the aggressive and conservative working capital policies for 17 industrial groups and a large sample of 263 public limited companies listed on the Karachi Stock Exchange (KSE) using cross-sectional data for the period 1998–2003. Using analysis of variance (ANOVA) and the least significant difference (LSD) test, the study found significant differences among their working capital investment and financial policies across different industries. Moreover, rank order correlation confirmed that these insignificant differences were remarkably stable over the six-year study period. Finally, ordinary least regression analysis indicated a negative relationship between the profitability measures of firms and the degree of aggressiveness of working capital investment and financing policies. The implication of the two studies is that firms should pay greater attention to their liquidity position. This involves having sufficient cash because poor cash management may land a firm in financial trouble as it will not be able to pay its current bills and eventually the firm may face technical insolvency in the short run. In the long run, bankruptcy may result if poor cash management persists.

Corporate liquidity can be assessed in the context of whether it is static or dynamic, as noted by [Uyar \(2009\)](#). The static view relates to the use of conventional ratios like working capital and liquidity ratios. The ratios measure the liquidity of the firm at a specific time. On the other hand, the dynamic view takes into account the firm's ongoing liquidity position. Therefore CCC days are the very outcome of the dynamic view of cash management. However, the size of the firm has been found to be a significant factor that determines CCC days ([Moss and Stine, 1993](#)). [Moss and Stine \(1993\)](#) pointed out that large firms have shorter CCC days than small firms.

[Eljelly \(2004\)](#) elucidated that efficient liquidity management entails planning and controlling of current assets and current liability in such a manner that eliminates that risk of inability to meet short-term financial commitments. He examined the current ratio and the cash gap (CCC) as a relation between profitability and liquidity. The study analysed Saudi Arabian companies using correlation and regression analysis. His findings indicated that CCC is more important as a measure of liquidity than current ratio that affects profitability. The size of the firm was also found to be significant on profitability at the industry level. The study argued that there is a negative relationship between profitability and liquidity and also there is a great variation among the industries with respect to the measure of liquidity.

[Mosa et al. \(2012\)](#) also used size and debt ratios as control variables in their study on the association between working capital management and profitability of food companies in Tehran. They examined 33 companies between 2006 and 2011 using various working capital variables that have been used in previous research and added medium-term debt payment. Using debt ratio and log sales (as a proxy for the size of the firm) as control variables, they found that increasing collection cycle, debt payment period, inventory turnover and CCC leads to a decrease in profitability. This implies that managers must decrease the collection period, debt payment, inventory turnover and CCC to the lowest level in order to enhance shareholder value.

2.1. Corporate governance and working capital management

As a result of major corporate and market failure, the issue of corporate governance has received much attention. Good corporate governance practices are significant in not only enhancing the performance of the company but also attracting investment capital (Velnampy and Pratheepkanth, 2013).

There are two main approaches of corporate governance that can be identified. These are Agency theory and Stewardship theory. Agency theory is viewed as the separation of control from ownership. It implies that the professional managers manage a firm on behalf of the shareholders. There has been significant discussion that in order to reduce agency problem a firm's top management should have a significant ownership. On the other hand Stewardship theory is considered as stakeholder's theory which is concerned with a firm's board of directors and its CEO.

Corporate governance underpins that no individual should have unfettered power of decision, the board of directors should have appropriate balance of skills, experience, independent and knowledge of the company, the board should present a fair, balanced and understandable assessment of the company position. In addition, the level of remuneration should be sufficient to attract, retain and motivate directors; there should be a dialogue with shareholders through the use of Annual General Meetings (AGM). However companies in Kenya, South Africa and Egypt have the choice of complying or explain as the countries are following the UK version. On the other hand, in Nigeria, the code is mandatory hence following the America version.

Among the dimensions of corporate governance are board size, committees and number of meeting. Although there is no universal acceptance of board size, Lipton and Lorsch (1992) argue that a board size of eight or nine directors is optimal, whilst Jensen (1993) argues that the optimum board size should be around seven or eight directors. The relationship between board size and performance may differ not just by firm specific characteristics but also by national institutional characteristics. In countries with different institutional backgrounds, the functions of boards are different, and therefore the expected board size – performance relation may be expected to differ.

3. Data collection and methodology

3.1. Data collection

We utilise secondary data from the Orbis database to investigate the association between working capital management and profitability. We chose industrial firms in South Africa, Nigeria, Egypt and Kenya; thus, for the purpose of this research, firms in the financial sector, insurance, business services, renting and other services are excluded from the sample. We chose these countries because they represent the three different groups as per United Nations conference on Trade and Development (UNCTAD) classification.

A typology of African countries' industrial performance has been provided by UNCTAD (2011). The typology is based on two indicators: (i) the level of the country's industrialisation in 2010; and (ii) the industrial growth performance 1990–2010. The industrialisation level of each country is captured by its manufacturing value added (MVA) per capita. This indicator allows the identification of the countries which have a substantially higher manufacturing capacity than the regional average. The regional average per capita is US\$100. African countries that have an MVA per capita level of \$200 and above are considered to have a relatively advanced industrialisation level.

Industrial growth performance is measured by the compound annual growth rate of MVA per capita. This indicator identifies the most dynamic African industrialisers as well as stagnating and de-industrialising countries. Countries that have an MVA per capita growth rate higher than 2.5% are regarded as having a relatively very high growth performance. The 2.5% threshold is about 3.5 times the African average MVA per capita growth of 0.7%.

Based on these indicators, African countries are divided into five groups: *forerunners*; *achievers*; *catching-up*; *falling-behind* and *infant stage*. Our chosen countries are classified as: *forerunners* (Egypt); *achiever* (South Africa); and *falling behind* (Kenya and Nigeria) respectively. In our choice, we also take into consideration that each country represents an economic block within the African continent. Unfortunately we are not able to access data from countries classified as being in the catching up

Table 1
Stability test in Egypt.

F-statistic	0.603932	Prob. $F(10,31)$	0.7983
Log likelihood ratio	9.077630	Prob. Chi-square (10)	0.5248
Wald statistic	6.039317	Prob. Chi-square (10)	0.8119

Chow breakpoint test: 64.

Null hypothesis: no breaks at specified breakpoints.

Varying regressors: all equation variables.

Equation sample: 2260.

and infant stage. The most recent period for this investigation is 2005–2009. Some of the firms are not included in the sample due to lack of information for certain periods. The sample is based on statements of income and statements of financial positions of 102 large firms in size from 2005 to 2009. The 102 firms comprises of 20 firms each from Egypt, Nigeria and Kenya and 42 from South Africa.

3.2. Variables

The dependent variable is profitability proxied as gross operating profit. Gross operating profit is defined as the turnover subtract cost of sales, divided by total assets excluding financial assets. When financial assets are part of the total assets, its operating activities contribute little to the overall return on assets. This is the reason why we consider that return on assets is not considered as a measure of profitability of the firm.

The independent working capital variables include number of days accounts payable, number of days inventories, the number of days accounts receivables and cash conversion cycle. We take accounts payable as a proxy to determine the firm's payment policy to its suppliers. It is computed as (accounts payable \times 360)/cost of sales. Also we take number of days inventories to determine the firm's inventory policy. It is calculated as (inventories \times 360)/cost of sales. In addition, we determine the firm's collection policy as a proxy of the number of days accounts receivable. It is computed as (accounts receivable \times 360)/turnover.

Past research has used control variables along the main working capital variables. This is to enable an opposite analysis of working capital management of the firm's profitability (Deloof, 2003). We use the logarithm of assets to measure the size of the firm as a control variable. We use the logarithm of the number of directors in order to measure board size as regards to the association of corporate governance and working capital. A number of recent empirical papers (Boone et al., 2007; Coles et al., 2008; Guest, 2008) have examined the determinants of board size. Board size is expected to be greater when the need for information and hence board advice is high. Such needs are expected to increase with firm scale and complexity

Also in order to check whether one regression is sufficient for each country, we used Chow test to test for structural stability across the four countries. As shown in Tables 1–4 below there is no suggestion of any presence of structural break or instability. In addition, in order to test the stationarity of the variable, we used panel unit root test across the four samples. There was no evidence to suggest non-stationarity of the variables.

Table 2
Stability test in Kenya.

F-statistic	0.123555	Prob. $F(10,31)$	0.9993
Log likelihood ratio	1.993210	Prob. Chi-square (10)	0.9964
Wald statistic	1.235546	Prob. Chi-square (10)	0.9996

Chow breakpoint test: 108.

Null hypothesis: no breaks at specified breakpoints.

Varying regressors: all equation variables.

Equation sample: 2268.

Table 3
Stability test in South Africa.

F-statistic	0.593585	Prob. F(10,31)	0.8943
Log likelihood ratio	8.693240	Prob. Chi-square (10)	0.7161
Wald statistic	5.435746	Prob. Chi-square (10)	0.89461

Chow breakpoint test: 190.

Null hypothesis: no breaks at specified breakpoints.

Varying regressors: all equation variables.

Equation sample: 2498.

3.3. Regression method

Since the panels' data contain observations on the same cross-sectional firms over the years 2005–2009, there might be cross-sectional effects on each firm or on a set of firms, especially those in the same country. Fixed effects and random effects are available in order to deal with such problems. The fixed effect model (FEM) assumes differences in the intercepts across the firms; each individual intercept does not vary over time, which means that it is time invariant. However, the intercept varies between cross-sectional firms so each firm has fixed, unique intercepts and differences in the intercepts reflect the unobserved differences between these cross-sectional units. These differences could be due to differences in different firms, for example managerial style or philosophy. This takes the form of:

$$Y_{it} = \beta_{1i} + \beta_2 X_{2it} + \beta_3 X_{3it} + \mu_{it} \quad (1)$$

While the random effect model estimates the coefficients under the assumption that individual or group effects are uncorrelated with other regressors. The model allows the intercepts to vary between units but variation is treated as randomly determined. It takes the form:

$$Y_{it} = \beta_1 + \beta_2 X_{2it} + \beta_3 X_{3it} + \mu_{it} + \varepsilon_i \quad (2)$$

where $\varepsilon_i + \mu_{it} = \omega_{it}$. ω_{it} is the error component which consists of cross-section error component and time series error component (Gujarati, 2003). Therefore one obvious disadvantage of the random effect is that there is a need to make specific assumptions about the distribution of a random component (Asteriou and Hall, 2011). That is, the error components are not correlated with each other and are not auto-correlated across both cross-section and time series units. If the unobserved group specific effects are correlated with explanatory variables, then the estimates will be biased and inconsistent. Nevertheless, if the variance of the error terms is zero, then there is no difference between the random effects and pooling of data, in which case the use of pooled OLS is appropriate.

4. Results from the data analysis

Table 5 gives descriptive statistics of 102 non-financial firms across Egypt, Kenya, Nigeria and South Africa for a period of five years from 2005 to 2009. The table reveals that firms in Kenya are more profitable, with a mean of 40%, than the peer firms in other countries in our sample. This is despite the fact that Kenya is ranked behind South Africa and Egypt in terms of industrialisation level. However, there are some firms in South Africa and Egypt which are more profitable with a maximum

Table 4
Stability test Nigeria.

F-statistic	0.427541	Prob. F(10,31)	0.8073
Log likelihood ratio	3.197220	Prob. Chi-square (10)	0.8261
Wald statistic	1.339541	Prob. Chi-square (10)	0.7118

Chow breakpoint test: 117.

Null hypothesis: no breaks at specified breakpoints.

Varying regressors: all equation variables.

Equation sample: 2169.

Table 5
Summary statistics.

	GOP			AR			CCC			AP			INV			Firm size			CG			GDP growth		
	Mean	Med	Std	Mean	Med	Std	Mean	Med	Std	Mean	Med	Std	Mean	Med	Std	Mean	Med	Std	Mean	Med	Std	Mean	Med	Std
KN	40.2	47.5	23.8	13	10	10.3	13.2	5	17.2	32.9	23.5	49.7	35.0	29.1	0.6	5.0	5.1	0.44	6	5	0.41	0.04	0.05	0.02
ZA	34.2	33.9	15.2	46.9	42	33.2	13.2	11.1	33.9	43.3	41	22.1	46	34	0.7	5.2	5.6	1.1	9	7.9	0.98	0.03	0.05	0.02
NG	32.6	36.9	21.8	40.5	35	38.3	16.2	14.6	56.6	38	27.5	46.8	25	22	8.0	4.7	4.9	0.7	7	6.4	0.51	0.06	0.06	0.05
EGY	20.7	21	10.4	42.2	26	41	26.8	10	33.7	21.8	18	18.4	28	14	4.2	4.7	4.9	0.8	9	8.1	0.37	0.06	0.07	0.01

Table 6
Pearson correlation matrix.

	GOP	AR	CCC	INV	AP	SIZE	GDP	CG
Egypt								
GOP	1							
AR	−0.01	1						
CCC	−0.09	0.87	1					
INV.T	−0.09	0.71	−0.58	1				
AP	0.19	0.48	0.08	0.30	1			
SIZE	0.63	0.38	0.33	0.35	0.16	1		
GDP	0.06	0.17	0.08	0.23	0.54	0.07	1	
CG	−0.07	−0.09	−0.14	−0.26	−0.49	0.61	0.07	1
Kenya								
GOP	1							
AR	−0.03	1						
CCC	−0.61	0.44	1					
INV.T	0.03	0.39	0.32	1				
AP	−0.71	0.34	0.08	0.18	1			
SIZE	0.10	0.10	0.13	0.27	0.02	1		
GDP	0.06	−0.03	−0.06	−0.16	0.05	0.018	1	
CG	−0.16	−0.51	−0.39	−0.14	−0.56	0.49	0.63	1
Nigeria								
GOP	1							
AR	−0.32	1						
CCC	−0.31	0.42	1					
INV.T	0.02	0.20	0.48	1				
AP	−0.07	0.26	−0.35	0.20	1			
SIZE	0.08	0.08	0.11	0.16	0.05	1		
GDP	0.02	−0.09	0.01	0.08	−0.07	0.12	1	
CG	−0.06	−0.04	−0.64	−0.61	−0.19	0.48	0.47	1
South Africa								
GOP	1							
AR	−0.23	1						
CCC	−0.29	0.64	1					
INV.T	0.04	0.07	0.22	1				
AP	−0.11	0.34	−0.35	−0.16	1			
SIZE	0.01	0.07	0.03	0.09	0.20	1		
GDP	0.04	0.09	0.02	−0.01	0.12	0.04	1	
CG	−0.08	−0.63	−0.09	−0.07	−0.19	0.047	0.67	1

OP, gross operating profit; AR, accounts receivable; CCC, cash conversion cycle; INVE, inventories turnover; AP, accounts payable; Size, size of the firm, GDP is the gross domestic product growth and CG is corporate governance measure by the log of board size.

gross operating profit of 68% and 56% respectively. In addition, the minimum profitability level is 5% for Egypt and −25%, −59% and −56% for South Africa, Kenya and Nigeria respectively. The table further shows a mean of 13-day cash conversion cycles for firms in Kenya which indicates how efficient they are in managing working capital compared with firms in Egypt, with a mean of 27 days. Also, firms in Kenya and Nigeria take longer to settle the accounts payable than they take to collect money from their customers. This could be attributed to the level of capital market development and corporate governance in the sense that there is higher investor protection in more developed countries like South Africa and Egypt.

We linked corporate governance with into the board size. As Table 5 reveals, the board size for companies in South Africa and Egypt is large compared with those companies in Kenya and Nigeria. Board size is expected to be greater when the need for information and hence board advice is high. As shown in Table 6, find that board size is positively related to firm size. Information needs are expected to increase with firm scale and complexity. The advantage of larger board size is the greater collective information that the board subsequently possesses and hence larger boards will lead to higher performance (Dalton et al., 1999).

Table 6 shows an inverse relationship between the number of days a firm takes to collect cash from their customers and profitability across the four countries. This means that, if the number of days of accounts receivable increases, the profitability of the firm decreases. In other words, the less time taken by customers to settle their accounts, the more cash is available to replenish the stock and hence more sales leading to profitability. Also the inventory turnover ratio which measures the velocity of conversion of stock into sales is positively correlated with profitability in Kenya, Nigeria and South Africa. A low inventory turnover ratio indicates an inefficient management of inventory and, on the other hand, the faster the inventory sells, the less the funds of the company are tied up. On the other hand, the relationship between profitability and accounts payable is positive for firms in Egypt and inverse for companies in other countries. This typifies that the longer it takes the firms in Egypt to settle their accounts, the more profitable they are. Conversely, the shorter the time firms in Kenya, Nigeria and South Africa take to settle their accounts, the more profitable they are. This could be attributed to the fact that good relationships with suppliers will help in cutting deals in terms of discounts and delivery on time.

The cash conversion cycle measuring working capital management has an inverse relationship with profitability across the four countries. This demonstrates that firms which collect cash from their customers as soon as possible, ensuring that they sell their inventories as quickly as possible while taking longer to pay their suppliers, are likely to be more profitable.

Table 6 also shows that there is a positive association between profitability and size of the firm. This implies that, as a firm grows in size, its profitability also grows. One of the reasons is that large firms are able to diversify their investments, employ sophisticated techniques and also experienced managers. Our findings of negative correlation between cash conversion cycles and number of days of accounts receivable with the profitability of the firms are consistent with previous research (Deloof, 2003). In addition Table 6 reveals a negative relation between board size and profitability across the four countries. This is consistent with Eisenberg et al. (1998) who found negative relationship between board size and firm performance holds for small private firms in Finland. This means that the larger the board is more likely to reflect problems in carrying out the advisory role rather than the monitoring role. Also board cohesiveness is undermined because board members will be less likely to share a common purpose, communicate with each other clearly, and reach a consensus that builds on the directors' different points of view (Lipton and Lorsch, 1992).

5. Multiple regression analysis

Pearson correlation has one weakness in that it does not allow one to identify causes from consequences. For instance it is hard to say whether a shorter accounts receivable period leads to higher profitability or a higher profitability is as a result of a shorter account receivable period. In examining the dynamic relationships between two (or more) variables, the causality may be mutual rather than simply unidirectional. This situation often occurs among macroeconomic variables. We used Vector autoregression modelling as an attempt to deal with this situation. We captured the simultaneity using the following specification:

$$Y(t) = \alpha_1 + \beta_1 w(t) + y_1 y(t-1) + y_2 y(t-1) + x(t) + e_y(t) \quad (3)$$

The endogenous variable $y(t)$ depends upon the contemporaneous value of the other endogenous variable $w(t)$, i.e. they are contemporaneously correlated, and depends as well on lagged values of itself, $y(t-1)$, and lagged values of the other dependent variable, $w(t-1)$. In addition, $y(t)$ depends upon an exogenous variable, $x(t)$.

This means care should be exercised when the Pearson correlation coefficient because they cannot provide a reliable indicator of association in a manner which controls for additional explanatory variables. Therefore we used regression analysis to investigate how working capital management influences the profitability of a firm. We used the Akaike Information Criteria (AIC) and F test to determine the best estimation. The AIC value for the fixed effect model (FEM) is less than that of pooled OLS across the four panels hence the FEM model was appropriate across the four samples. The FEM assumes firm-specific intercepts, which capture the effects of those variables particular to each are constant over time. Consistent with Garcia-Turuel and Martininez-Solano (2007) FEM present important in that

Table 7
Effect of working capital on Gross operating profit.

	Egypt	Kenya	Nigeria	South Africa
Cons.	-20.464** (9.592)	0.77 (55.962)	1.06 (4.380)	30.96*** (1.313)
GDP	0.08* (6.090)	13.07** (0.145)	0.15** (0.04)	0.470** (0.050)
SIZE	0.210*** (0.035)	0.017*** (0.02)	4.87*** (0.910)	0.347*** (0.237)
CG	-0.022* (4.041)	-0.012** (0.241)	-0.010** (0.05)	-0.010* (5.021)
AR	-0.06** (0.042)	-0.06*** (0.49)	-0.20*** (0.020)	-0.108*** (0.008)
R ²	0.47	0.20	0.24	0.25
DW	2.05	1.97	1.93	1.89

Source: 2005–2009 Survey data, authors' computation.

GOP is the dependent variable, GDP is Gross Domestic Product growth, SIZE is the size of the firm, CG is corporate governance proxied by log of board size and AR is account receivable. The result is estimated by using fixed effect model.

*** Denotes significance at 1%.

** Denotes significance at 5%.

* Denotes significance at 10%.

individual firms are heterogeneous. Time series and cross-section data studies which does not control for this heterogeneity run the risk of obtaining biased results. We estimated the fixed effects across the firms in our four samples and found that they were not significant individually and as a group.

To assess the relationship between working capital and profitability of the firm, we modelled profitability as a function of the four working capital management measures. Table 5 reports the mean gross operating profit is less than the median across the four countries, suggesting that the distribution of GOP is skewed to the right. In order to control the skewness and specific country effects, the variability of GOP, natural logarithm of assets and GDP growth are incorporated in the least square estimation.

Our first model is to find the significance of accounts receivable on profitability of the firm with size and GDP growth being control variables. This takes the form of:

$$GOP_{it} = \beta_{1i} + \beta_2 GDP + \beta_3 SIZE_{2it} + \beta_4 CG_{it} + \beta_5 AR_{5it} + \mu_{it} \quad (4)$$

The result of model 1 as indicated in Table 7 below shows that the coefficients of accounts receivable are negative across the countries and are significant at 1% for firms in Nigeria and South Africa and are not significant for firms in Egypt. This consistent with [Raheman and Nasr \(2007\)](#), implying that increase in accounts receivable days leads a reduction on profitability. Also, the result shows a positive coefficient for size and significant at 1% for firms in Egypt and Nigeria. This means that the larger the firm size, the more profitable is. On the other hand, the result shows that, despite the fact that there is a positive association between size and profitability, it is not significant for firms in Kenya and South Africa. Examining the effect of corporate on profitability, the result reveals a negative relationship between board size and profitability for firms in our samples. Like our study, [Yermack \(1996\)](#) employed the use of fixed effect to address the problem of endogeneity and found a negative relationship in large firms. The results could be attributed to the fact that with large boards, there could be a problem of communication and decision making as there is likely to be disagreement among the directors.

The adjusted R² is 47% for firms in Egypt, meaning that the accounts receivable, GDP, board size and firm size can explain 47% of firm profitability. Conversely, the size of the firm, GDP, board size and accounts receivable can only explain 20% for firms in Kenya. This concludes that at least one out of accounts receivable, board size and firm size is associated with profitability of the firm. Further, the Durbin-Watson is 2.05, 1.97, 1.93 and 1.89 for Egypt, Kenya, Nigeria and South Africa respectively, which shows that there is no concern for serial correlation of residuals.

5.1. Model 2

$$GOP_{it} = \beta_{1i} + \beta_2 GDP_{2i} + \beta_3 SIZE_{3it} + \beta_4 CG_{it} + \beta_5 AP_{4it} + \mu_{it} \quad (5)$$

Table 8

Effect of working capital on Gross operating profit.

	Egypt	Kenya	Nigeria	South Africa
Cons.	-17.35** (6.530)	1.29* (35.901)	1.72 (4.666)	38.25*** (1.410)
GDP	0.129 (5.25)	0.57** (0.145)	4.45** (0.07)	2.72** (0.014)
SIZE	0.785** (0.745)	1.012*** (1.23)	6.16*** (0.960)	0.09** (0.240)
CG	-0.039 (3.145)	-0.024** (0.179)	-0.041** (0.041)	-0.021* (5.121)
AP	0.050* (0.033)	-0.356*** (0.142)	-0.04* (0.010)	-0.08*** (0.010)
R ²	0.41	0.40	0.35	0.29
DW	1.96	1.91	1.87	1.94

Source: 2005–2009 Survey data, authors' computation.

GOP is the dependent variable, GDP is Gross Domestic Product growth, SIZE is the size of the firm, CG is corporate governance proxied by log of board size and AP is account payable. The result is estimated by using fixed effect model.

*** Denotes significance at 1%.

** Denotes significance at 5%.

* Denotes significance at 10%.

Table 8 shows the result our second model indicating that there is a positive association between accounts payable and profitability for firms in Egypt. This means that any increase in accounts payable days positively influences the profitability of the firm.

However, the result shows that AP is significant at 10%. On the other hand, AP is significant in influencing profitability with a negative coefficient as regards to firms in the other countries. This implies that, with proper controls in place, such as scheduled payment plans, a firm may take advantage of suppliers' discounts which may significantly reduce the cost of purchases, hence increasing profitability. The result makes economic sense in that the longer the firm delays its payment to the creditors, the higher the level of working capital it reserves and uses it to increase profitability. More specific the inclusion of AP for the firms in Kenya improves the pseudo R squared significantly. On the other hand, slow payment may indicate that a firm is in financial trouble.

5.2. Model 3

$$GOP_{it} = \beta_1 + \beta_2 GDP_{2i} + \beta_3 SIZE_{3it} + \beta_4 CG_{it} + \beta_5 INV_{5it} + \mu_{it} \quad (6)$$

We also examined our third model using the inventories turnover as an independent variable with size being a control variable. The result as shown in Table 4 indicates that there is a negative relationship between the profitability of the firm and stock days across the four countries. High stock days may indicate a case of a firm overstocking, having obsolete stock or deficiencies in product or marketing effort. However, there are instances where one expects a low turnover. For instance, high inventory levels may occur in case of anticipation of rapidly rising prices or expected market shortage. On the other hand, a high turnover may depict inadequate inventory levels which may lead to a loss of business as a result of stock shortage. Our result shows that, the faster the firms sell their stock, the more profitable they are. However there are differences in the magnitude of the influence in that there is higher magnitude for firms in Egypt and South Africa than Kenya and Nigeria.

The fourth model uses cash conversion cycles as an independent variable instead of days accounts receivable, number of days accounts payable and stock turnover.

5.3. Model 4

$$GOP_{it} = \beta_1 + \beta_2 GDP_{2i} + \beta_3 SIZE_{3it} + \beta_4 CG_{it} + \beta_5 CCC_{5it} + \mu_{it} \quad (7)$$

The cash conversion cycle is used to measure efficiency of working capital management. Table 10 below shows that cash conversion cycle has a negative relation with profitability with relatively the same magnitude across the four samples. In addition, the cash conversion cycle is significant at 1%. This implies that a decrease in the cash conversion cycle significantly improves the firm's profitability. Durbin-Watson is 2.22, 1.945, 1.933 and 1.832 for Egypt, Kenya, Nigeria and South Africa respectively; hence there is no concern for serial correlation of the errors. Shin and Soenen (1998) argued that the

Table 9
Effect of working capital on Gross operating profit.

	Egypt	Kenya	Nigeria	South Africa
Constant	-25.75** (8.809)	0.97** (47.402)	11.06** (5.040)	36.25*** (1.313)
GDP	0.64** (12.1)	11.31** (0.914)	0.131** (0.09)	0.946** (0.914)
SIZE	0.970*** (0.713)	5.76*** (0.336)	2.73*** (1.010)	0.410*** (0.244)
CG	-0.019* (3.291)	-0.041** (0.216)	-0.061** (0.056)	-0.036* (5.391)
INV	-0.911** (0.139)	-0.06*** (0.691)	-0.03** (0.03)	-0.10*** (0.043)
R ²	52	0.12	0.21	19
DW	2.10	1.94	1.89	1.98

GOM is the dependent variable, GDP is the growth of the economy measured by Gross domestic product growth, SIZE is company size measured by log of total assets, CG is corporate governance proxied by log of board size and INV measure stock days. Results obtained by estimating the FEM.

*** Denotes significance at 1%.

** Denotes significance at 5%.

* Denotes significance at 10%.

negative association between CCC and profitability of the firm could be explained by the market power or market share. That is a shorter CCC because of bargaining power by the supplier and customers as well as higher profitability due to market dominance.

Working capital management may be affected by macroeconomic factors; the growth in the Gross domestic product (GDP) in its nominal terms has been included. Since good economic condition tend to be reflected in the firm's profitability, this control for the evolution of the economic cycle as noted by Garcia-Turuel and Martininez-Solano (2007). In addition, in order to control for inflationary pressure that affects key components of working capital, incorporation of real GDP is paramount. The Inclusion of GDP may also be a proxy to reflect the development of capital market. La-Porta et al. (1997) noted that countries with less developed capital market are characterised with weak legal protection of corporate shareholders and creditors. This makes financing through credit more attractive. In addition, Fisman and Love (2003) argue that trade creditors mitigate weak creditor protection and imperfect information (Table 9).

We tested whether there is multicollinearity with the variables. The variance inflation factor or tolerance of the explanatory variables is used to detect whether one predictor has a strong linear relationship with the variables. The variance inflation factor measures how the variance of an estimated regression coefficient increases if the predictor is correlated. The rule of thumb is that a value of variance inflation factor exceeding 4 warrants investigation and if the value exceeds 10, there is serious multicollinearity. In the presence of multicollinearity, it requires removing the violating variable. Table 11 shows that there is no variable with a variance inflation factor exceeding 4 and hence there is no concern for multicollinearity.

Table 10
Effect of working capital on Gross operating profit.

	Egypt	Kenya	Nigeria	South Africa
Constant	-21.038** (8.299)	1.021** (45.762)	1.70 (4.390)	33.87*** (1.251)
GDP	16.800* (13.109)	10.79* (0.921)	0.129* (0.102)	0.971** (0.101)
SIZE	0.997** (0.718)	5.41*** (0.221)	4.87*** (0.910)	0.267*** (0.232)
CG	-0.014* (3.214)	-0.056** (0.162)	-0.071** (0.059)	-0.019* (5.274)
CCC	-0.104** (0.017)	-0.38** (0.020)	-0.13** (0.010)	-0.138*** (0.008)
R ²	50	0.15	0.16	25
DW	2.010	1.95	1.94	1.84

GOM is the dependent variable, GDP is the growth of the economy measured by Gross domestic product growth, SIZE is company size measured by log of total assets, CG is corporate governance proxied by log board size and CCC measure Cash conversion Cycle. Results obtained by estimating the FEM.

*** Denotes significance at 1%.

** Denotes significance at 5%.

* Denotes significance at 10%.

Table 11
Variance inflation factor.

Model		Coefficients				T	Sig.	Collinearity statistics	
		Unstandardised coefficients		Standardised coefficients	Tolerance			VIF	
		B	Std. error						Beta
1	(Constant)	59.911	33.678		1.779	0.076			
	Accounts receivable	0.400	0.561	0.018	0.714	0.476	0.860	1.163	
	Stock turnover	2.282	0.912	0.080	2.501	0.013	0.505	1.979	
	Accounts payable	-1.270	0.608	-0.054	-2.090	0.037	0.782	1.279	
	Size	0.002	0.000	0.276	10.944	0.000	0.819	1.221	

Dependent variable: Gross operating profit.

We also evaluate whether our models are correctly specified and that we have included important variables. As shown in Table 12, using the Ramsey Reset test, our models are correctly specified.

Table 12
Model specification test.

EGYPT: Ramsey RESET test:			
F-statistic	0.232684	Prob. F(1,19)	0.6351
Log likelihood ratio	0.304304	Prob. Chi-square (1)	0.5812
Kenya: Ramsey RESET test:			
F-statistic	2.851965	Prob. F(1,25)	0.1037
Log likelihood ratio	3.240831	Prob. Chi-square (1)	0.0718
South Africa: Ramsey RESET test:			
F-statistic	0.278085	Prob. F(1,299)	0.5984
Log likelihood ratio	0.283533	Prob. Chi-square (1)	0.5944
Nigeria: Ramsey RESET test:			
F-statistic	0.046330	Prob. F(1,114)	0.8300
Log likelihood ratio	0.048758	Prob. Chi-square (1)	0.8252

6. Conclusion

This investigation has found that there is a positive relationship between profitability the size of a firm. This could be attributed to many factors, including that large firms are more likely to employ high-skilled managers, use technology and enjoy economies of scale as a result of their ability to buy in bulk. In addition, we found that there is a positive association between profitability and company policy on accounts payable with regard to firms in Egypt and the reverse in other countries. In addition, the paper indicates that there is a positive relation between firm profitability and inventory turnover. Increasing inventory turnover reduces the holding costs such as rent, utilities, insurance and other costs associated with maintaining inventories. Reducing holding costs increases net income and profitability as revenue from selling products remains higher.

When a firm sells its products and does not receive cash for it, the firm is said to have granted trade credit to customers. Trade credit thus creates receivables which the firm is expected to collect in the near future. A business may lose its customers to competitors if it does not allow credit to them. Thus investment in receivables may not be a matter of choice but a matter of survival. Given that investment in receivables has both benefits and costs, it becomes important to have such a level of investment in receivables, at the same time observing the twin objectives of liquidity and profitability. To ensure optimal investment in receivables, a firm is required to have an appropriate credit policy. Credit policy is designed to minimise costs associated with credit while maximising the benefits from it. Credit policy is either lenient or stringent. A lenient credit policy tends to give credit to customers on very liberal terms and standards such that credit is granted for longer periods even to those whose credit worthiness is not fully known. A stringent credit policy allows credit only to those whose credit worthiness has been ascertained and is financially strong.

Our result reveals that there is an inverse relationship between accounts receivables and profitability. This means that, in order to enhance profitability, a firm must have policies to accelerate accounts receivables collection. This could involve giving discount on earlier settlements and having a standard collection procedure and policy. The management of receivables is a practical problem. Firms can find their liquidity under considerable strain if the level of their accounts receivables is not properly regulated. Thus management of accounts receivables is important, for without it receivables will build up to excess levels leading to declining cash flows. Poor management of receivables will definitely result in bad debts which lower the firm's profitability levels.

A useful way of assessing the liquidity of a firm is with the cash conversion cycle because it combines both statements of financial position and income statement data to create a time dimension measure. The shorter the cash conversion cycle, the better the firm is at managing its cash flow. The negative relationship between cash conversion cycles and profitability shows that the profitability of the firm reduces whenever the cash conversion cycle lengthens. This paper therefore suggests that managers can create value for their shareholders by reducing the cash conversion cycle. The cash conversion cycle measures how effective managers are in managing the working capital. That is, having a trade-off between profitability and liquidity. This suggests that a firm should speed up collections from debtors and at the same time delay payment of accounts payable. This is because our findings indicate that profitable firms take longer to settle their accounts payable.

Moreover, the result indicates that large firms tend to be more profitable than small firms. One of the possible reasons is that large firms could be more diversified and could employ sophisticated technology and experienced or skilful managers. Large firms are also likely to have large board. The result reveals a negative relation between board size and profitability for firms in our samples. This implies that large board could be characterised with inefficiency and communication overlap. However, larger board size has greater collective information possessed by the board which is also valuable for the monitoring function.

Although, our study considered growth in GDP as an external factor, changes in interest rates or industry averages may also shed more light in working capital management. Future research may consider exploring these factors.

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