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# THE EFFECT OF CASH CONVERSION CYCLE ON PROFITABILITY IN OMANI COMPANIES

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## ABSTRACT

This article investigates the relationship between working capital management (WCM) and several profitability measures. We used cash conversion cycle (CCC) and its components as the measure of working capital management and used different profitability ratios such as gross profit margin, EBIT margin, and return on assets (ROA). By using the data from 66 non-financial companies for a four-year period from 2013 to 2016, we performed dynamic panel data analyses. We applied the generalized method of moments (GMM) to test how WCM affects profitability. Results revealed that CCC has nonlinear significant effect on GPM and EBITM, whereas, among its components, only Accounts Payable Days (APD) has significant effect on GPM and EBITM. However, ROA is not influenced by CCC and its components.

JEL Classification: C23, G30, L25

Key words: Cash conversion cycle, Working capital management, Profitability, Liquidity, Oman

## 1. INTRODUCTION

Company financial management is responsible for two fundamental issues: long-term investment and financing decisions and short-term financial decisions. These decisions can be portrayed on a simple balance sheet of which assets and liabilities are classified as current and non-current. Non-current items such as capital budgeting and capital structure are related to long-term decisions. Current items are related to working capital. Although the long-term decisions on are crucial for success, short-term working capital decisions may be critical for company survival.

Capital is the most important concept in accounting and finance literature, because it underlines almost all financial decisions. From an accounting perspective, capital can be considered under two categories; permanent capital and working capital. In the long term, success is measured by the increase in equity. In the short-term, items of working capital consisting of mainly operating items such as receivables, inventory and payables are important for continued operations. Managing those items affects both liquidity and profitability. Working capital refers to current assets and mainly covers cash and cash equivalents, receivables, and inventory. When we deduct current liabilities, which cover trade payables and other short-term obligations, it is called net working capital.

Managing net working capital is critical for company performance, because each item has several operational implications. Allowing trade credits to customers can directly affect sales revenue, especially if it is a common industry practice. Determining optimal inventory level is equally important if holding costs matter. Delaying payment for trade payables may provide a finance source for some companies. In short, net working capital items are the components of the company's operating cycle and effectively managing those items has a direct and significant impact on company performance. Therefore, working capital management is of vital importance for the company. Among others, the cash conversion cycle (CCC) is an important tool for measuring success in working capital management. This article investigates the relationships between CCC and different profitability measures. The rest of the paper is organized as follows; the next section provides a short review of literature. Section 3 gives the details on data and methodology. Section 4 discusses the results of the study and the last section concludes the findings.

## 2. LITERATURE REVIEW

Numerous studies on working capital management exist; most of them focused on the working capital-profitability relationship. The main reason for this is probably the trade-off between liquidity and profitability. Working capital management is closely related to the operating cycle concept. Effectiveness in managing working capital components directly affects the length of company's operating cycle (Paul and Wilson, 2006). According to Pass and Pike (1984), working capital may be regarded as a balance between current assets and current liabilities; although this balance changes from business to business, firms aim for a positive net current asset position. This argument can be challenged, because it depends on the composition of current assets and there is no clear-cut level for this balance.

Moreover, a company may benefit from a negative balance as far as it is manageable. The central issue in working capital management (WCM) is the trade-off between liquidity and profitability. Smith (1980) claims that WCM affects firm profitability and risk; as a result, its value. Liquidity is measured by several ratios and indicators; however, the most commonly used measure in WCM studies is the cash conversion cycle (CCC). Richards and Laughlin (1980) describe CCC as the net time interval between a firm's actual cash outflows for purchasing productive resources and the cash inflows from product sales. It provides a better understanding of the liquidity compared to static balance sheet ratios. They state that liquidity indicators are static measures ignoring the going-concern approach to liquidity analysis and suggest an operating cycle approach. The cash conversion cycle reflects the net time interval between actual cash expenditures on a firm's purchase of productive resources and the ultimate recovery of cash receipts from product sales, hence it establishes the period required to convert cash disbursements back into cash inflow from operations.

CCC is calculated as the sum of days of sales outstanding (average collection period) and days of sales in inventory less days of payables outstanding (Keown et al., 2003). According to Padachi (2006), CCC is a comprehensive measure of working capital as it shows the time lag between expenditure for purchasing raw materials and the collection from sales of finished goods. A cycle means a higher investment in working capital.

Some studies used only the cash conversion cycle, while others also used its components in the analyses. It is better to focus on CCC components, because they may have different practical implications. One of the most important studies is Deloof's study (2003) which is a cornerstone for the WCM-Profitability relationship. Deloof investigated the relationship for a sample of 1009 Belgian companies from non-financial sectors for the period 1992-1996. By using number of days' receivables, inventory and payables and also cash conversion cycle, he arrived at two important results: profitability can be enhanced by decreasing receivables and inventory days, and less profitable companies pay their invoices late compared to more profitable companies. Lazaridis and Tryfonidis (2006) analyzed the relationship between working capital management and profitability by using data of 131 firms listed on the Athens Stock Exchange for the period 2001-2004. They found a significant relationship between gross profit margin and cash conversion cycle. They also found negative relationships regarding the components of cash conversion cycle and suggested managers keep the components at optimal level for improving profitability.

It is commonly accepted that a trade-off exists between liquidity and profitability. Successful working capital management aims at finding an efficient or optimal level. Adekola, Samy and Knight (2017) evaluated how working capital management affected profitability while ensuring adequate liquidity. By using the data of 50 Nigerian listed companies for the period 2002-2011, they found different results in different industries. In some industries, profitability and liquidity reinforce each other, but some other industries show a trade-off between them.

Even though working capital is vital, the level of working capital depends on the company asset and capital structure, which is mainly driven by sectorial conditions. Ching, Novazzi, and Gerab (2011) investigated the working capital management-profitability relationship for Brazilian companies by grouping the sample companies as 'working capital intensive' and 'fixed capital intensive'. They concluded that managing working capital properly is important for both groups and also that cash conversion efficiency improves profitability.

How working capital management influences profitability may depend on company size; company ability to access external financing sources may change with size, and it will directly affect the working capital practices and alternative solutions. Tran, Abbott, and Yap (2017) analyzed 200 Vietnamese manufacturing SMEs for the period 2010-2012. They found that efficient working capital management affects both profitability and liquidity, and also noted a negative relationship between profitability and cash conversion cycle, consistent with previous findings.

Company characteristics and financial situation are important factors affecting the working capital management-profitability relationship but the relationship is also affected by other external factors such as macroeconomic conditions. Enqvist, Graham, and Nikkinen (2014) analyzed the relationship between WCM and profitability from a different perspective by considering business cycle effects. They used a very long period of data from 1990 to 2008 for Finnish companies and found that economic conditions affect the relationship. The impact of efficient working capital management which is measured by CCC on profitability is more significant during economic downturns.

Several factors might be affecting working capital management and therefore its impact on profitability. Some studies aimed at finding out those determinants. Moussa (2019) conducted a study on factors influencing the firms' working capital behavior by using a panel data set of 68 industrial firms, from six different sectors, publicly traded on the Egyptian stock exchange from 2000 to 2010. Working capital requirement and CCC were used to measure working capital behavior. He analyzed nine determining factors, namely operating cash flow, growth opportunities, performance, firm value, age, size, leverage, economic conditions and industry type. The results showed that age, performance and value have positive relationship with working capital requirement; however, operating cash flow, economic conditions, leverage, and growth have a negative relationship.

Sectorial or industry-specific factors play an important role in working capital practices. Several studies have focused on the analyses related to industry conditions. Chang (2018) investigated the cash conversion cycle impact on corporate performance by using a large dataset consisting of 266,547 firm-year observations from 46 countries covering different industries. The author adjusted all variables according to industry and found a significantly negative relationship of CCC-ROA, indicating profitability and also a significantly negative relationship of CCC-Tobin's, indicating the value. The results implied that firms may improve profitability and value by shortening their CCC; however, the effect of CCC reduces or reverses if the firm is at a lower level of CCC. Marttonen, Monto, and Kärri (2013) analyzed the working capital management influence on profitability for a sample of Finnish industrial maintenance companies. Unlike previous researchers, they used ROI as the profitability measure. The results showed that ROI has a negative correlation with the cash conversion cycle. They also found that the cash conversion cycle is shorter for large companies compared to SMEs in the same industry.

Some studies claimed that working capital management and profitability have a linear relationship, whereas others found a non-linear relationship instead. Singhania and Mehta (2017) investigated WCM effects on firm profitability for a sample of 13 Asian countries for the period 2004-2014; the sample consisted of non-financial firms from different industries. Their results showed that the relationship is non-linear, with U shaped or inverted U shaped relationships for different countries. Altaf and Shah (2018) examined the WCM-profitability relationship using data from 437 non-financial Indian companies. They employed a two-step generalized method of moments technique. The results suggested an inverted U-shaped relationship between working capital management and profitability. They also found that profitability increases at lower levels of CCC, and decreases at the higher levels of CCC.

Abuzayed (2012) argued that firms in emerging economies need to pay more attention to working capital management. She examined the effect of cash conversion cycle and its components on profitability, also by bringing the evidence on market evaluation of managerial skills in working capital management. The study covering data from 52 companies listed on the Amman Stock Exchange for the period 2000-2008 found a positive link between profitability and CCC, implying that more profitable firms are less motivated to manage their working capital.

Some studies analyzed working capital management effect on financial performance through a long-term perspective, by considering the relationship with firm valuation. Ba˜nos-Caballero et al. (2019) investigated the relationship between net operating working capital and firm value with reference to country characteristics by using a large dataset of 30 countries for the period 1995 to 2013. They found that shareholders attach a higher value to the net working capital of companies in countries with a greater financial and economic development and better investor protection. Ben Le (2019) examined how working capital management affected firm valuation, profitability and risk by using a panel data set of 497 Vietnamese publicly traded firms for the period 2007-2016 and found a significantly negative relationship. The results of the study implied that a trade-off exists between profitability and risk control, and also suggested that decreased levels of net working capital or CCC are associated with improvement in both firm market value and financial performance. Results of the study implied that an optimal level of net working capital exists which maintains balance between profitability and risk.

This study makes significant contribution to the literature. First of all, it provides new evidence for the relationship between working capital management and profitability, by using Oman's publicly traded company data. We provide new models by incorporating new variables. Furthermore, to the best of our knowledge, this is the first study using the data of Omani companies.

# 3. DATA AND MODELS

## 3.1 DATA AND SAMPLE

The sample of the study is composed of 66 non-financial companies from the Muscat Securities Market, Oman. The data covers a four-year period from 2013 to 2016; it is a balanced panel data set. With a balanced panel, the same units appear in each time period. With an unbalanced panel, some units do not appear in each time period, often due to attrition. (Wooldridge, 2002)

## 3.2 MODELS AND VARIABLES

The study aims at testing the relationship between WCM and profitability. For WCM, we used the Cash Conversion Cycle (CCC) and its components. To generate CCC, we firstly take the total of Accounts Receivable Days (ARD) and Inventory Conversion Days (ICD) then we subtracted Accounts Payable Days (APD) from this total. We took three profitability measures, namely, Gross Profit Margin (GPM), EBIT Margin (EBITM), and Return on Assets (ROA).

We added control variables to the models in order to improve result accuracy. In accordance with the literature, these control variables will reduce the biasness of error terms and increase significance and explanatory power of the models. We firstly added natural logarithm of total assets (LNTA) to control for company asset size. We took the natural logarithm because in absolute numbers it would boost variance. We added gearing ratio (GEAR) to control for firm financial leverage. To control for company growth, we included Sales Growth (SG) in the model. The Market to Book Value ratio (MV/BV) was added. Table 1 shows the variables and selected studies we referred for determining the variables.

TABLE 1
Variables and Referred Studies

| Variable | Description | Studies |
|---|---|---|
| CCC | Cash Conversion Cycle | Richards and Laughlin (1980), Padachi (2006), Lazaridis and Tryfonidis (2006), Tran et al. (2017), Singhania and Mehta (2017) |
| $CCC^2$ | Square of CCC | Altaf and Shah (2018), Singhania and Mehta (2017) |

TABLE 1 (*continued)*

| Variable | Description | Studies |
|---|---|---|
| ARD | Accounts Receivable Days | Deloof (2003), Tran et al. (2017) Altaf and Shah (2018) |
| ICD | Inventory Conversion Days | Deloof (2003), Tran et al. (2017), Altaf and Shah (2018) |
| APD | Accounts Payable Days | Deloof (2003), Tran et al. (2017), Altaf and Shah (2018) |
| GPM | Gross Profit Margin | Lazaridis and Tryfonidis (2006), Altaf and Shah (2018) |
| EBITM | EBIT Margin | Padachi (2006), Mathuva (2010) |
| ROA | Return on Assets | Ching et.al (2011), Chang (2018), Singhania and Mehta (2017), Enqvist (2014), Yazdanfar and Öhman (2014) |
| LAGD | Lagged Dependent Variables (t-1) | Chang (2018) |
| MB/BV | Market Value/Book Value | Chang (2018) |
| LNTA | Natural Logarithm of Total Assets | Altaf and Shah (2018) |
| SG | Sales Growth | Tran et.al (2017), Singhania and Mehta (2017) |
| GEAR | Gearing Ratio | Tran et.al (2017), Singhania and Mehta (2017), Moussa (2019), Chang (2018) |

The models are summarized below.

1 $GPM_{i,t} = \beta_0 + \beta_1 CCC_{i,t} + \beta_2 CCC^2{}_{i,t} + \gamma_i CV_{i,t} + \varepsilon_{i,t}$

2 $GPM_{i,t} = \beta_0 + \beta_1 ARD_{i,t} + \beta_2 ICD_{i,t} + \beta_3 APD_{i,t} + \gamma_i CV_{i,t} + \varepsilon_{i,t}$

3 $GPM_{i,t} = \beta_0 + \beta_1 ARD^2{}_{i,t} + \beta_2 ICD^2{}_{i,t} + \beta_3 APD^2{}_{i,t} + \gamma_i CV_{i,t} + \varepsilon_{i,t}$

4 $EBITM_{i,t} = \beta_0 + \beta_1 CCC_{i,t} + \beta_2 CCC^2{}_{i,t} + \gamma_i CV_{i,t} + \varepsilon_{i,t}$

5 $EBITM_{i,t} = \beta_0 + \beta_1 ARD_{i,t} + \beta_2 ICD_{i,t} + \beta_3 APD_{i,t} + \gamma_i CV_{i,t} + \varepsilon_{i,t}$

6 $EBITM_{i,t} = \beta_0 + \beta_1 ARD^2{}_{i,t} + \beta_2 ICD^2{}_{i,t} + \beta_3 APD^2{}_{i,t} + \gamma_i CV_{i,t} + \varepsilon_{i,t}$

7 $ROA_{i,t} = \beta_0 + \beta_1 CCC_{i,t} + \beta_2 CCC^2{}_{i,t} + \gamma_i CV_{i,t} + \varepsilon_{i,t}$

8 $ROA_{i,t} = \beta_0 + \beta_1 ARD_{i,t} + \beta_2 ICD_{i,t} + \beta_3 APD_{i,t} + \gamma_i CV_{i,t} + \varepsilon_{i,t}$

9 $ROA_{i,t} = \beta_0 + \beta_1 ARD^2{}_{i,t} + \beta_2 ICD^2{}_{i,t} + \beta_3 APD^2{}_{i,t} + \gamma_i CV_{i,t} + \varepsilon_{i,t}$

where

| | |
|---|---|
| $GPM$ | Gross Profit Margin |
| $CCC$ | Cash Conversion Cycle |
| $ARD$ | Accounts Receivable Days |
| $ICD$ | Inventory Conversion Days |
| $APD$ | Accounts Payable Days |
| $EBITM$ | Earnings Before Interest and Tax Margin |
| $ROA$ | Return on Assets |
| $CV$ | Control Variables |
| $\varepsilon$ | Disturbance Term of equation |

## 3.3 METHODOLOGY

As in the prior literature (Altaf and Shah, 2018; Ba˜nos et al., 2013; Chang, 2018), we assume a nonlinear relationship between WCM and profitability. More precisely, we predict CCC and $CCC^2$ have opposite signs. We test this hypothesis by using nine models including three different profitability ratios (Gross Profit Margin, EBIT Margin and Return on Assets) as dependent variables and four WCM indicators (CCC and its three components ARD, ICD, and APD) as explanatory variables along with their squares.

Due to the nature of data, which include time as well as cross sectional units, we used panel data regression models. In the literature, CCC and its components are considered as explanatory variables to understand the changes in profitability; however, there is an inverse effect whereby profitability can affect net working capital. This bilateral relation generates biased and inefficient regression results in regular OLS models. To handle this problem, we first considered CCC and its components as endogenous variables in the regression models and performed the Generalized Method of Moments (GMM) with instrumental variables (Altaf and Shah, 2018; Singhania and Mehta, 2017). In this method, the interrelations among dependent variables and endogenous variables are stated in equations before formulating the regression function. GMM also includes lagged dependent variables as explanatory variable, so that the model becomes a dynamic panel model. The inclusion of lagged variables, on the other hand, will cause serial correlation, which would lead to less efficient coefficients in the regression. The benefit of GMM model arises here, as it takes second order difference as an instrumental variable to estimate lagged variable and eliminates serial correlation (Baltagi, 2005).

The data were also tested for multicollinearity and heteroscedasticity. For multicollinearity, we checked both partial correlations among independent variables and VIF scores. Though the results show lack of multicollinearity in many equations, in some models we faced severe multicollinearity among the CCC components and their squares. Therefore, we divided the models including ARD, ICD, and APD and their squares into two groups. The correlation matrix in Table 4 provides the correlation coefficients of independent variables. We also provided the VIF score of each variable in statistical tables of the corresponding model. The results show no perfect multicollinearity as the VIF scores are lower than 10.

TABLE 2
Test Results for Homoscedasticity

| Model | Levene Test Statistics | *F* Test Results ($p > F$) |
|---|---|---|
| 1 | 0.156 | 0.856 |
| 2 | 0.006 | 0.994 |
| 3 | 0.082 | 0.921 |
| 4 | 1.066 | 0.346 |
| 5 | 0.638 | 0.530 |
| 6 | 1.100 | 0.335 |
| 7 | 0.004 | 0.997 |
| 8 | 0.016 | 0.984 |
| 9 | 0.007 | 0.993 |

To test for heteroscedasticity, we used Levene's test of homogeneity and the results were not surprising. The error terms have significantly unequal variances, which would reduce model efficiency. Thus, we performed regression analysis with standard errors corrected by GMM. After applying the GMM method, we generated residuals and reexamined homoscedasticity. Results show no heteroscedasticity for all models. The Levene Test results for homoscedasticity are presented in Table 2.

## 4. ANALYSIS RESULTS

### 4.1 DESCRIPTIVE STATISTICS

The following Table 3 summarizes the descriptive statistics for all variables. Descriptive statistics show an average of 26% of GPM, 10% EBITM, and almost 6% of ROA. In our sample, companies' cash cycle is around 107 days or 3.5 months. They have a longer collection period (93 days) than payment (57 days). Companies, on average, convert and keep inventory around 70 days. Gearing ratio statistics portray that companies rely more on equity to finance assets as the gearing ratio is around 46%. Average revenue growth exceeded 20% per year, which is considered satisfactory. Finally, mean market value of companies is 73% more than corresponding book values of equity reported in financial statements.

TABLE 3
Descriptive Statistics

| Variable | Obs | Mean | Median | Std.Dev. | Min | Max |
|---|---|---|---|---|---|---|
| GPM | 264 | 0.261 | 0.258 | 0.182 | -0.386 | 0.842 |
| EBITM | 264 | 0.103 | 0.099 | 0.183 | -0.889 | 0.625 |
| ROA | 264 | 0.058 | 0.062 | 0.087 | -0.428 | 0.629 |
| CCC | 264 | 106.89 | 94.44 | 107.17 | -193 | 715 |
| ARD | 264 | 92.77 | 74.69 | 75.11 | 2.9 | 443 |
| ICD | 264 | 71.42 | 53.54 | 79.37 | 0.6 | 685 |
| APD | 264 | 57.30 | 45.01 | 42.17 | 1.4 | 242 |
| LNTA | 264 | 3.421 | 3.450 | 1.426 | 0.765 | 6.726 |
| GEAR | 264 | 0.456 | 0.425 | 0.25 | 0.09 | 1.37 |
| SG | 264 | 0.215 | 0.03 | 2.654 | -0.75 | 43 |
| MVBV | 264 | 1.734 | 1.305 | 1.638 | -1.119 | 12.5 |

The comparison of means and medians reveal no significant difference in almost all variables. yet they have differences for ARD, ICD, APD, and MVBV. Second, means portray higher values than medians. Means of three components of the cash conversion cycle exhibit relatively higher values than medians.

As the second step, we analyzed correlations among variables. GPM shows a significant negative correlation with GEAR and ARD while GPM has a positive relationship with ICD. EBITM, on the other hand, has a positive relationship with NLTA, MV/BV, and shows an inverse pattern with ARD, and APD. The third profitability measure, ROA, depicts positive relation with NLTA whereas it has an inverse relationship with GEAR. CCC is negatively correlated with all profit measures; however, these relationships lack significance. $CCC^2$ has a positive relationship with GPM and EBITM and negative relationship with ROA.

These two models (Model 2 and Model 3) exhibit a strong linear relation between APD and GPM because in both models linear and non-linear components of APD have the same signs.

TABLE 4
Correlation Matrix

| | GPM | EBITM | ROA | CCC | LNTA | GEAR | SG | MVBV | ARD | ICD | APD | $CCC^2$ | $ARD^2$ | $ICD^2$ | $APD^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GPM | 1 | | | | | | | | | | | | | | |
| EBITM | 0.671* | 1 | | | | | | | | | | | | | |
| ROA | 0.340* | 0.481* | 1 | | | | | | | | | | | | |
| CCC | -0.091 | -0.024 | -0.018 | 1 | | | | | | | | | | | |
| LNTA | 0.034 | 0.235* | 0.155* | -0.159* | 1 | | | | | | | | | | |
| GEAR | -0.203* | -0.045 | -0.292* | 0.007 | 0.204* | 1 | | | | | | | | | |
| SG | -0.088 | -0.073 | -0.037 | 0.029 | -0.025 | 0.020 | 1 | | | | | | | | |
| MVBV | 0.009 | 0.170* | 0.102 | -0.038 | 0.174* | 0.266* | -0.060 | 1 | | | | | | | |
| ARD | -0.219* | -0.159* | -0.038 | 0.584* | 0.005 | 0.225* | 0.0432 | -0.216* | 1 | | | | | | |
| ICD | 0.126* | 0.028 | -0.045 | 0.751* | -0.319* | -0.140* | 0.082 | 0.016 | 0.043 | 1 | | | | | |
| APD | 0.079 | -0.168* | -0.105 | -0.090 | -0.188* | 0.118 | 0.158* | -0.258* | 0.379* | 0.052 | 1 | | | | |
| $CCC^2$ | 0.117 | 0.001 | -0.032 | 0.812* | -0.198* | -0.096 | 0.003 | -0.005 | 0.350* | 0.785* | 0.040 | 1 | | | |
| $ARD^2$ | -0.211* | -0.132* | -0.060 | 0.465* | 0.078 | 0.224* | 0.017 | -0.146* | 0.940* | -0.05 | 0.395* | 0.314* | 1 | | |
| $ICD^2$ | 0.171* | 0.064 | -0.035 | 0.623* | -0.210* | -0.162* | 0.031 | 0.045 | -0.022 | 0.861* | -0.001 | 0.887* | -0.046 | 1 | |
| $APD^2$ | 0.075 | -0.189* | -0.129* | -0.134* | -0.147* | 0.118 | 0.171* | -0.218* | 0.354* | -0.02 | 0.939* | 0.031 | 0.423* | -0.026 | 1 |

Notes: * indicate level of significance at 5%.

The next three models (Model 4, 5, and 6) takes EBITM as dependent variable. The flow of models is in the order of GPM models. In Model 4, the power of CCC on explaining EBITM is tested. The model and results follow:

Model 4 $\mathrm{EBITM}_{i,t} = \beta_0 + \beta_1 \mathrm{CCC}_{i,t} + \beta_2 \mathrm{CCC}^2{}_{i,t} + \gamma_i \mathrm{CV}_{i,t} + \varepsilon_{i,t}$

EBITM is one of the most widely used indicators for evaluating firm operating performance. It provides accurate measure of the firm's operations. In the fourth model (Table 5), contrary to Model 1, CCC has a positive effect on EBITM and $\mathrm{CCC}^2$ has a negative effect. The model reveals a nonlinear relationship as Model 1 but this time the shape of function is an inverse u-shaped parabola because the sign of $\mathrm{CCC}^2$ is negative, the model has significance at 1% and partial coefficients of both CCC and $\mathrm{CCC}^2$ are significant at 5%. The inverse signs of explanatory variables in Model 1 and Model 4 may rely upon non-cash expenses. COGS is used in deriving gross profit and it has a considerable amount of depreciation which is a noncash expense, yet operating expenses and operating revenues have relatively less non-cash components which causes a positive relation among CCC and EBITM.

In Models 5 and 6, we tested the effects of components of CCC on EBITM.

Model 5 $\mathrm{EBITM}_{i,t} = \beta_0 + \beta_1 \mathrm{ARD}_{i,t} + \beta_2 \mathrm{ICD}_{i,t} + \beta_3 \mathrm{APD}_{i,t} + \gamma_i \mathrm{CV}_{i,t} + \varepsilon_{i,t}$

Model 6 $\mathrm{EBITM}_{i,t} = \beta_0 + \beta_1 \mathrm{ARD}^2{}_{i,t} + \beta_2 \mathrm{ICD}^2{}_{i,t} + \beta_3 \mathrm{APD}^2{}_{i,t} + \gamma_i \mathrm{CV}_{i,t} + \varepsilon_{i,t}$

ARD, ICD and their non-linear counterparts have no impact on EBITM; however, APD has significance on EBITM in first and second orders. This pattern of variables shows similar pattern with that of GPM. The signs of APD, and $\mathrm{APD}^2$ are negative and significant, hence the results do not suggest a u-shaped relationship among EBITM and APD. Unlike GPM, EBITM is negatively affected by APD. Though both models satisfy at the 1% significance level, Model 6 has higher overall and partial significances.

The last three models (Model 7, Model 8, and Model 9) attempt to examine how CCC affects ROA. ROA is considered a profit indicator and is commonly used in the literature. There are two major differences between ROA and other two dependent variables (GPM and EBITM). First is that ROA is dependent upon the balance sheet and income statement, whereas GPM and EBITM are derived from the income statement. Second, ROA is calculated using net income, which includes financing and other income statement accounts. This means ROA has a weaker link with the company's operating cycle; however, GPM and EBITM depend strongly on working capital accounts. They are expected to have more significant relationship with the operating cycle.

In Model 7 (Table 5), the effect of CCC on ROA is analyzed using the following model and results are mentioned below.

Model 7 $$\mathrm{ROA}_{i,t} = \beta_0 + \beta_1 \mathrm{CCC}_{i,t} + \beta_2 \mathrm{CCC}^2{}_{i,t} + \gamma_i \mathrm{CV}_{i,t} + \varepsilon_{i,t}$$

Explanatory variables in Model 7 generate results with poor significance. Both CCC and $\mathrm{CCC}^2$ have no effect on ROA; however, the constant term shows significance. This may result from the nature of ROA. ROA is affected by both income statement accounts and balance sheet accounts which makes it more complicated and difficult to explain because of more parameters.

The last two models (Model 8, and Model 9) are built for understanding the influence of CCC components on ROA. The models and results follow;

Model 8 $$\mathrm{ROA}_{i,t} = \beta_0 + \beta_1 \mathrm{ARD}_{i,t} + \beta_2 \mathrm{ICD}_{i,t} + \beta_3 \mathrm{APD}_{i,t} + \gamma_i \mathrm{CV}_{i,t} + \varepsilon_{i,t}$$

Model 9 $$\mathrm{ROA}_{i,t} = \beta_0 + \beta_1 \mathrm{ARD}^2{}_{i,t} + \beta_2 \mathrm{ICD}^2{}_{i,t} + \beta_3 \mathrm{APD}^2{}_{i,t} + \gamma_i \mathrm{CV}_{i,t} + \varepsilon_{i,t}$$

Model 8 (Table 6) and Model 9 (Table 7) also fail to affect ROA significantly. Except for the constant term, all components of both models have no effect on ROA. On the other hand, overall significance in both models is satisfied.

On the whole the research findings suggest that the GPM and EBITM are more responsive to WCM accounts than ROA. The reasons for this difference may arise from the structure of ROA. It is derived from the balance sheet and income statement, which boosts parameters for estimation and it is calculated by taking net income, which includes revenues, and expenses; these are not relevant to net working capital accounts, such as financing or non-operating expenses/revenues.

TABLE 5
Models with CCC and CCC$^2$

| | Dependent Variable | Constant | CCC | | CCC$^2$ | | Lag. Dep. Var. | | LNTA | | Gearing | | SG | | MVBV | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Coeff. | Coeff. | VIF | Coeff. | VIF | Coeff. | VIF | Coeff. | VIF | Coeff. | VIF | Coeff. | VIF | Coeff. | VIF |
| Model 1 | GPM | 0.42* | -0.003*** | 5.2 | 0.000003*** | 4 | 0.644*** | 3 | -0.026 | 1.3 | 0.009 | 1.2 | 0.068* | 2.8 | 0 | 1.1 |
| | (std. errors) | (0.218) | (0.001) | | (8.79E-7) | | (0.497) | | (0.034) | | (0.190) | | (0.041) | | (0.012) | |
| Model 4 | EBITM | 0.096 | 0.002** | 4.9 | -2.13E-6** | 3.7 | 0.412*** | 6.8 | -0.075** | 1.4 | 0.085 | 1.2 | 0.133*** | 6.6 | -0.002 | 1.1 |
| | (std. errors) | (0.124) | -0.001 | | (8.92E-7) | | (0.128) | | (0.030) | | (0.139) | | (0.034) | | (0.009) | |
| Model 7 | ROA | -0.205** | -0.0001 | 4.9 | -5.44E-07 | 3.7 | 0.366 | 1.5 | 0.096*** | 1.4 | -0.171 | 1.6 | 0.024 | 1 | 0.006 | 1.2 |
| | (std. errors) | (0.103) | -0.001 | | (8.31E-7) | | (0.333) | | (0.023) | | (0.112) | | (0.032) | | (0.007) | |

TABLE 6
Models with Components of CCC

| | Dependent Variable | Constant | APD | | ARD | | ICD | | Lag. Dep. Var. | | LNTA | | Gearing | | SG | | MVBV | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Coeff. | Coeff. | VIF | Coeff. | VIF | Coeff. | VIF | Coeff. | VIF | Coeff. | VIF | Coeff. | VIF | Coeff. | VIF | Coeff. | VIF |
| Model 2 | GPM | 0.1422 | 0.0021*** | 1.4 | 6E-05 | 1.4 | 0.0006 | 1.6 | 0.812*** | 2.8 | -0.053* | 1.3 | -0.182 | 1.3 | 0.094* | 2.8 | 0.005 | 1.29 |
| | (std. errors) | (0.1757) | (0.008) | | (0.0011) | | (0.0006) | | (0.3003) | | (0.0308) | | (0.2309) | | (0.0530) | | (0.010) | |
| Model 5 | EBITM | 0.2516 | -0.0022** | 1.4 | 0.0014 | 1.4 | -0.0002 | 1.6 | 0.372** | 6.9 | -0.081** | 1.4 | 0.247 | 1.3 | 0.122** | 6.7 | -0.005 | 1.3 |
| | (std. errors) | (0.1559) | (0.0009) | | (0.0011) | | (0.0006) | | (0.1590) | | (0.0323) | | (0.2549) | | (0.0522) | | (0.011) | |
| Model 8 | ROA | -0.2083** | -0.0011 | 1.4 | 0.0002 | 1.4 | -0.0003 | 1.6 | 0.154 | 1.6 | 0.093*** | 1.4 | -0.162 | 1.9 | 0.016 | 1.1 | 0.008 | 1.39 |
| | (std. errors) | (0.0901) | (0.0007) | | (0.0006) | | (0.0004) | | (0.3237) | | (0.0220) | | (0.1766) | | (0.0401) | | (0.007) | |

# TABLE 7
## Models with Squares of Components of CCC

| | Dependent Variable | Constant | APD$^2$ | | ARD$^2$ | | ICD$^2$ | | Lag. Dep. Var. | | LNTA | | Gearing | | SG | | MVBV | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Coeff. | Coeff. | VIF | Coeff. | VIF | Coeff. | VIF | Coeff. | VIF | Coeff. | VIF | Coeff. | VIF | Coeff. | VIF | Coeff. | VIF |
| Model 3 | GPM | 0.235** | 6.73E-6*** | 1.4 | -2.48E-06 | 1.4 | 2.69E-07 | 1.2 | 0.648** | 2.8 | -0.046* | 1.3 | 0.021 | 1.3 | 0.070* | 2.8 | 0.004 | 1.22 |
| | (std. errors) | (0.1145) | (2.17E-6) | | (197E-6) | | (2.94E-7) | | (0.2653) | | (0.0241) | | (0.135) | | (0.036) | | (0.008) | |
| Model 6 | EBITM | 2.52E+02 | -1.22E-5*** | 1.4 | 5.61E-07 | 1.3 | -1.94E-07 | 1.1 | 0.296** | 6.8 | -0.073** | 1.4 | 0.299* | 1.3 | 0.08** | 6.6 | -0.006 | 1.24 |
| | (std. errors) | 0.1181 | (2.69E-6) | | (2.24E-6) | | (3.49E-7) | | (0.1258) | | (0.0302) | | (0.168) | | (0.040) | | (0.01) | |
| Model 9 | ROA | -0.2147 | -2.20E-06 | 1.4 | 8.59E-07 | 1.4 | -3.03E-07 | 1.1 | 0.092 | 1.6 | 0.093*** | 1.4 | -0.133 | 1.8 | 4.4E-4 | 1.1 | 0.006 | 1.31 |
| | (std. errors) | (0.0818) | (2.13E-6) | | (1.57E-6) | | (2.59E-7) | | (0.282) | | (0.0218) | | (0.122) | | (0.033) | | (0.007) | |

Notes: *, **, *** indicate level of significance at 10%, 5% and 1%, respectively

Moreover, our results reveal an opposite direction between signs of explanatory variables for GPM and those for EBITM. CCC has negative effect on GPM, and a positive effect on EBITM. $CCC^2$ is positively correlated with GPM and negatively correlated with EBITM. Both models hold nonlinear relationship between profit measures and net working capital accounts, which suggests an optimum point where companies can maximize their operating profit by managing their CCC.

The difference in signs may depend on the fact that GPM holds sales and cost of sales, which are strongly related to receivables, inventories and payables; however, EBITM also consists of operating expenses which may not have strong connection with net working capital accounts.

The study takes components of CCC as separate model to estimate profitability. These models have poor partial significance except for APD. APD has a significant effect on both GPM and EBITM. Surprisingly, the other two variables (ARD and ICD) expected to have more influence lack significance.

We also computed the maximum point of CCC days for which the company can maximize its profit. It is calculated as taking the first derivative of the regression function and equalizing it to 0 $(-\beta_1 / 2 \beta_2 = 0)$. However, the result shows a dramatically high CCC around 17 months for GPM and 16 months for EBITM. We did not calculate optimum point for ROA as the variables in explaining ROA were insignificant. This may be because the coefficients of $CCC^2$ are quite low although significant. Hence, firms feel more comfortable to choose lower profitability against suffering from very long periods of CCC. In WCM literature, many studies show a trade-off between liquidity and profitability. Our finding of CCC days around 16-17 months is consistent with the trade-off.

Furthermore, among the components of CCC, only the APD has significance on GPM and EBITM. Apart from CCC and $CCC^2$, APD and $APD^2$ have the same sign. For GPM both take positive signs, whereas for EBITM they take negative signs.

## 5. CONCLUSION

In this article, we aimed at determining how WCM affects several profitability measures. We chose CCC along with its components as indicators for WCM and GPM, EBITM, ROA as profit measures. Prior literature suggests a bilateral relationship between WCM and profitability, so we used a regression model that considers endogeneity. Results show CCC has a nonlinear effect on GPM and EBITM with different signs. Because of non-linearity, we can assume that there is one optimal point which would maximize profit using net working capital accounts. This finding provides us insights into how companies can maximize profits by using net working capital accounts. The effects of CCC on GPM followed expectations; CCC has a negative relation with profitability and $CCC^2$ has positive correlation. EBITM, on the contrary, has an opposite response to the independent variables. EBITM is positively affected by CCC, and negatively affected by $CCC^2$. This distinction may stem from formulation differences of GPM and EBITM. GPM has more solid correlation with CCC and its components. Sales Revenue and Cost of Sales are directly related to ARD, ICD, and APD. Conversely, EBITM has components with weaker or no relation with CCC and its components. From this point of view, we can assume GPM is a more accurate dependent variable to be considered in this research field and literature. Components of CCC have portrayed a lower performance in explaining profitability. Among three variables, only APD has significant influence over GPM and EBITM.

The study has important implications for Omani companies regarding their working capital management practices. The results showed a nonlinear significant relationship between CCC and GPM. This nonlinearity implies an optimum point at which the companies maximize their profits by using CCC. Up to this point, as the companies decrease their CCC, this will increase GPM. Omani companies should aim at decreasing CCC in crafting their working capital strategies, by considering possible side effects. They should decrease ARD and ICD, and increase APD. However, while achieving these targets, companies should take into consideration their relationships with customers and suppliers. Particularly, APD has a significant effect on profit; hence, firms may increase their profitability by managing their trade payables policy.

The models concerning ROA have lower significance. Despite overall significance in models, explanatory variables generally have insignificant effects on ROA. It is derived by accounts from both balance sheet and income statement. This means it depends on more parameters and can vary more; hence our explanatory variables do not suffice to explain ROA.

This study has some limitations because it uses data only from Omani companies. This limits the number of observations in the data set. The study did not include any macroeconomic indicators in the models because it used data from a single country. In case of a multi-country study, these limitations can be eliminated.

To sum up, CCC has significant nonlinear effect on GPM. Companies should make their liquidity decisions depending on changes in gross profit. Successful management of working capital helps improve company profitability.

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