

## The Relationship between Working Capital Management and Profitability for Industrial Companies Listed in Amman Stock Exchange

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### ABSTRACT

The aim of this study is to analyze the relationship between working capital management components and profitability. The relationship between working capital management and profitability is examined using panel data analysis for a sample consists of 43 industrial companies listed in Amman Stock Exchange in Jordan, during the period (2000 - 2012). The results of regression analysis show a significant negative relationship between cash conversion cycle and profitability. This indicates shorting cash conversion cycle improve company profitability. Moreover, the managers can create value for their shareholders by shortening the number of collection payments period and inventories conversion period. The result also showed that there is positive relationship between payables deferral period and return on equity as a measurement of profitability. Furthermore, profitability increases with size and sales growth and decreases with leverage.

**Keywords:** Working Capital Management, Profitability, Receivables Collection Period, Inventories Conversion Period, Payables Deferral Period, Cash Conversion Cycle, Amman Stock Exchange, Jordan.

### INTRODUCTION

Over the last few years, the global economy has faced financial crisis that created a challenge for the businesses environment in a variety of industries. Such financial crisis started in developed countries, particularly in the United States of America (USA), where most of economic sectors were affected, specifically the industrial sector. The crisis was overriding other countries in the world including Arab countries but less severely. Jordan has been affected by the crisis as the rest of Arab countries (Sabri, 2012).

Organization for Economic Co-operation and Development, OECD (2009) showed that the global financial crisis in 2008 affected the working capital of companies by increasing late payment on receivables and increase inventories, thus they faced reduced demand for their goods and services. This caused a shortage in working capital and decreased liquidity. Consequently, a management of organizational resources, short-term working capital management in particular, became a basic part of companies' financial plans around the world. As a result, researchers and practitioners have focused on working capital management (Abuzayed, 2012).

Working capital management considers the ability of firms to fund the difference between short-term financial (current assets and current liabilities) Harris (2005). Management of these short term financial warrants a careful investigation since the working capital management plays an important role for the firm's profitability & risk as

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Received on 15/6/2014 and Accepted for Publication on 25/11/2014.

well as value (Smith, 1980). When firms managing working capital effectively and efficiently they can maximize their values and increase liquidity for the firm.

Many previous empirical studies in different countries addressed that working capital management plays an important role in companies' financial business health and profitability. This paper is an extension of the efforts of researchers in this area over a long period of twelve years (2000-2012). Also, in order to achieve the study objectives, the study adopted a new methodology (general least squares cross-section weights regression) to test this relationship. Finally, this study used another variable (return on equity) that is used by many foreign studies, and ignored by most of Jordanian studies.

The remainder of the study is organized as follows: Section 2 describes the objectives of the study. Section 3 explains the literature review. Section 4 presents the methodology of the study; its study sample, operational definition of the study variables, study hypotheses, and study models. Section 5 reports the empirical results, and finally section 6 presents the conclusions.

### **The objectives of the Study**

Our main goal of this study is to understand the relationship between working capital management components (receivables collection period, inventory conversion period, payables deferral period and the cash conversion cycle) and profitability. In addition, specify the most important variable that has the strongest relationship with profitability. Other goals include the impact of working capital on profitability in developing financial markets, such as Amman Stock Exchange, and to make managers understands the effect of working capital decisions on profitability.

### **Literature review**

Working capital is deemed as an index of the debtor's

ability to meet his obligations in case of liquidation (Fess, 1966). That is why managers spend a lot of time to find a balance among the working capital components, and meet short-term obligations (Zariyawati et al., (2009)). Working capital is a significant issue during financial decision making as a part of investment in assets that requires efficient management of working capital to reach the appropriate level and maximize shareholder value (Deloof, 2003, and Afza and Nazir, 2007).

Shin and Soenen (1998) stated that more efficient management of working capital results in a lesser need for external financing and better financial performance.

Richard and Laughlin (1980) and Lamberson (1995) pointed out that working capital management is important since it has a significant impact on profitability and risk, consequently creates the firm's value. Similarly, Sagan (1959) signaled that the goals of working capital should be managed along with the goals of liquidity and profitability.

Most empirical studies used cash conversion cycle and its components as a measurement of working capital management, and gross operating profit, return on assets and return on equity as a measurement of profitability when examining the relationship between working capital management and profitability (see, for example, Deloof, 2003; Lazaridis and Tryfonidis, 2006; Teruel and Solano, 2007; Dong and Su, 2010 and Gill et al., 2010).

Deloof (2003), Raheman and Nasr (2007), Zariyawati et al., (2009), Mojtahedzadeh et al., (2011) and Saghier et al., (2011) reported a significant negative relationship between profitability and the number of days accounts receivables, inventories, accounts payable and cash conversion cycle. While, Lyroudi and Lazaridis (2000) and Gill et al., (2010) reported that the cash conversion cycle is positively associated with

profitability (return on assets, net profit margin, and gross operating profit).

Soenen (1993), Shin and Soenen (1998), Erasmus (2010) and Kaddumi and Ramadan (2012) examined the relationship between net trading cycle (as a measure of working capital management) and profitability. They found that there is a negative relationship between a company's net trading cycle and its profitability, measured by return on assets. In other words, the shorter net trade cycles the higher its profitability.

Jose et al., (1996) examined the relationship between aggressive working capital management and profitability. The result shows a significant negative relationship between working capital management (measured by cash conversion cycle as a proxy for liquidity) and profitability (measured by return on assets and return on equity). Wang (2002) used cash conversion cycle as a measure for liquidity while using return on assets and return on equity as operating performance. The results found a significant negative relationship between cash conversion cycle and both return on assets and return on equity.

Lazaridis and Tryfonidis (2006) and Dong and Su (2010) found a negative relationship between profitability (measured by gross operating profit) and the cash conversion cycle and its components (receivable turnover days and inventory turnover days). They also found a significant and positive relationship between payable turnover days and profitability.

Teruel and Solano (2007) examined the effects of working capital management on profitability. They found a significant negative relationship between profitability and the number of days for account receivables, and the number of days of inventory for small and medium-sized Spanish enterprises. However, they cannot confirm that the number of days for accounts payable affects small and medium-sized

enterprises return on assets. Nobanee et al., (2011) examined the relation between the cash conversion cycle and profitability for corporation of different industries for Japanese firms. They concluded a strong negative relationship between the length of the firm's cash conversion cycle and its profitability in all sectors except for consumer goods companies and services companies.

Al-Debi'e (2011), and Hayajneh and Yassine (2011) examined the relationship between working capital management and profitability in Jordanian companies. The results showed that profitability of business organizations measured by gross operating profit is affected negatively by the length of time required to sell their products, the length of time required to collect their accounts receivable, and the length of time required to pay their accounts payable. While, Abuzayed (2012) found that profitability is affected positively by the cash conversion cycle.

Al-Mwalla (2012) examined the impact of working capital management policies (aggressive and conservative policies) on the firm's profitability and value in Jordanian firms. The conservative investment policy results show a positive impact on a firm's profitability and value, while the results of the aggressive financing policy show a negative impact on the firm's profitability and value.

Finally, Deloof (2003), Raheman and Nasr (2007), Zariyawati et al., (2009), Mojtahedzadeh et al., (2011), Al-Debi'e (2011), Hayajneh and Yassine (2011), Abuzayed (2012) and Al-Mwalla (2012) reported a positive relationship between firm size, sales growth and profitability, while leverage has a negative relationship with profitability.

## **Data and Methodology**

### **Study Sample**

The study sample includes all industrial public

shareholding firms listed on the Amman Stock Exchange (ASE) during the period (2000-2012). As with all same studies, we exclude financial institutions because they have a different set of financial data. Only firms that have the required financial and accounting data collected from the annual financial statement, were included in the study sample to calculate the study's main and control variables. Applying this criterion resulted in a final sample encompasses a total of 43 industrial firms.

### Study Variables

This study explains the operational definitions of all independent variables and dependent variables following Jose et al., (1996), Deloof (2003), Lazaridis and Tryfonidis (2006), Zariyawati et al., (2009), Dong and Su (2010), Gill et al., (2010), Al-Debi'e (2011) and Abuzayed (2012). All the independent variables are illustrated as unit of days, while dependent and control variables are measured as a ratio. Furthermore, the use of average in computing variables is to achieve more accurate and because the data extracted from the balance sheet is for one point of time.

### Independent Variables: Working Capital Components

#### Receivables Collection Period

Receivable collection period reflects how many days' receivables are collected on average and gives some indication of how fast companies can collect payments from sales. It is calculated using the following formula:

$$RCP_{it} = ([Avg\ Acc\ Rec_{it} / Net\ sales] \times 365).$$

$$Avg\ Acc\ Rec_{it} = ([Ending\ Acc\ Rec\ of\ year_{(t-1)} + Ending\ Acc\ Rec\ of\ year_{(t)}] / 2).$$

Where:

$RCP_{it}$ : Receivables Collection Period for company  $i$  at year  $t$ .

$Avg\ Acc\ Rec_{it}$ : Average Account Receivables for

company  $i$  at year  $t$

#### Inventories Conversion Period

The inventories conversion period is also called the inventories collection period. It indicates the frequency with which firms convert their cumulative of raw material into finished goods and then sell those products. It is calculated using the following formula:

$$ICP_{it} = ([Avg\ Inv_{it} / COGS_{it}] \times 365).$$

$$Avg\ Inv_{it} = ([Ending\ Inv\ of\ year_{(t-1)} + Ending\ Inv\ of\ year_{(t)}] / 2).$$

Where:

$ICP_{it}$ : Inventories Conversion Period for company  $i$  at year  $t$ .

$Avg\ Inv_{it}$ : Average Inventories for company  $i$  at year  $t$ .

#### Payables Deferral Period

Payables deferral period reflects how quickly accounts payable are paid on average. It is calculated using the following formula:

$$PDP_{it} = ([Avg\ Acc\ Pay_{it} / COGS_{it}] \times 365).$$

$$Avg\ Acc\ Pay_{it} = ([Ending\ Acc\ Pay\ of\ year_{(t-1)} + Ending\ Acc\ Pay\ of\ year_{(t)}] / 2).$$

Where:

$PDP_{it}$ : Payables Deferral Period for company  $i$  at year  $t$ .

$Avg\ Acc\ Pay_{it}$ : Average Accounts Payables for company  $i$  at year  $t$ .

#### Cash Conversion Cycle

Cash conversion cycle is a main comprehensive and powerful measure of managing working capital and assessing liquidity in companies (Richards and Laughlin, 1980). The cash conversion cycle is the time between spending cash for resources and cash receipts from product sales (Jose et al., 1996). It is calculated using the following formula:

$$CCC_{it} = (RCP_{it} + ICP_{it} - PDP_{it}).$$

Where:

$CCC_{it}$ : Cash Conversion Cycle for company  $i$  at year  $t$ .

$RCP_{it}$ : Receivables Collection Period for company  $i$  at year  $t$ .

$ICP_{it}$ : Inventories Conversion Period for company  $i$  at year  $t$ .

$PDP_{it}$ : Payables Deferral Period for company  $i$  at year  $t$ .

### Dependent Variables: Profitability Ratios

In order to identify the relationship between working capital management and profitability of the Jordanian industrial sector, the following measurement of the dependent variables is used:

#### Gross Operating Profit

This ratio also refers to business operating income, as a percentage of average total assets that can be used in measuring firm's profitability (Shin and Soenen, 1998 and Al-Debi'e, 2011). It is calculated using the following formula:

$$GOP_{it} = ([OI_{it} + Dep_{it}] / Avg\ total\ assets_{it}).$$

$$Avg\ total\ assets_{it} = ([Ending\ total\ assets\ of\ year_{(t-1)} + Ending\ total\ assets\ of\ year_{(t)}] / 2).$$

Where:

$GOP_{it}$ : Gross Operating Profit for company  $i$  at time  $t$ .

$OI_{it}$ : Operating Income for company  $i$  at time  $t$ .

$Dep_{it}$ : Depreciation for company  $i$  at time  $t$ .

#### Return on Assets

Return on assets is deemed one of the most ratios that is used to measure profitability as a proxy to measure performance of the company. This ratio measures the firm's overall effectiveness in generating profit from available assets. This ratio is calculated by the following formula:

$$ROA_{it} = (Net\ income_{it} / Avg\ total\ asset_{it}).$$

$$Avg\ total\ assets_{it} = ([Ending\ total\ assets\ of\ year_{(t-1)} + Ending\ total\ assets\ of\ year_{(t)}] / 2).$$

Where:

$ROA_{it}$ : Return on Assets for company  $i$  at time  $t$ .

$Avg\ total\ assets_{it}$ : Average total assets for company  $i$  at time  $t$ .

#### Return on Equity

Is another tool used to analyze profitability as a proxy of the company's performance. This measurement explains the degree of company allocating the funds of shareholders in the current business and the efficiency of using these capitals in the business. It can be used to analyze the effect of decision-making by company management on the shareholders' rate of return. ROE is calculated by the following formula ((Jose et al., 1996), (Danuletiu, 2010) and (Ching et al., 2011)):

$$ROE_{it} = (Net\ income_{it} / Avg\ total\ shareholders'\ equity_{it}).$$

$$Avg\ total\ shareholders'\ equity_{it} = ([Ending\ total\ shareholders'\ equity\ of\ year_{(t-1)} + Ending\ total\ shareholders'\ equity\ of\ year_{(t)}] / 2).$$

Where:

$ROE_{it}$ : Return on Equity for company  $i$  at year  $t$ .

$Avg\ total\ shareholders'\ equity_{it}$ : Average total shareholders' equity for company  $i$  at time  $t$ .

#### Control Variables

Many studies used control variables in addition to independent variables that influenced the companies' profitability. Horrigan (1965) signaled that firm size, sales growth and leverage have the most effect of working capital in companies.

#### Firm Size

The firm size is considered as a control variable because large companies tend to reduce cash gaps to enhance their profitability. In other words, large

companies have the ability to obtain favorable prices and credit conditions from suppliers. Various researcher's has used it as a control variable (see for example DeLoof (2003), Teruel and Solano (2007), and Gill et al., (2010)). Firm size is measured by the natural logarithm of total assets (Soekhoe, 2012).

### Sales Growth

Sales growth is a percentage that represents an increase, decrease in sales volume from year to year, and has an impact on working capital behavior. Many studies have utilized it as a control variable. Sales growth is calculated by the following formula:

$$SG_{it} = ([Sales_{(t)} - Sales_{(t-1)}] / Sales_{(t-1)}).$$

Where:

$SG_{it}$ : Sales Growth for company  $i$  at year  $t$ .

### Leverage

Financial leverage is measured by dividing total liabilities on total assets. It shows the rate of the company's debt relative to its assets and its potential risks. This ratio is calculated by the following formula:

$$Lev_{it} = (Total\ liab_{it} / Avg\ total\ assets_{it}).$$

Where:

$Lev_{it}$ : Leverage Ratio for company  $i$  at year  $t$ .

$Total\ liab_{it}$ : Total Liabilities for company  $i$  at year  $t$ .

### Study Hypotheses

To achieve the study objectives, six hypotheses will be used. These hypotheses are expressed using the null form as follows:

**H0<sub>1</sub>**: There is no significant relationship between working capital management components and gross operating profit.

**H0<sub>2</sub>**: There is no significant relationship between working capital management components and return on assets.

**H0<sub>3</sub>**: There is no significant relationship between

working capital management components and return on equity.

**H0<sub>4</sub>**: There is no significant relationship between cash conversion cycle and gross operating profit.

**H0<sub>5</sub>**: There is no significant relationship between cash conversion cycle and return on assets.

**H0<sub>6</sub>**: There is no significant relationship between cash conversion cycle return on equity.

### Study Models

The following six specifications that will be used to examine the relationship between working capital management and profitability:

$$GOP_{it} = \beta_0 + \beta_1 \ln(RCP_{it}) + \beta_2 \ln(ICP_{it}) + \beta_3 \ln(PDP_{it}) + \beta_4(SIZE_{it}) + \beta_5(SG_{it}) + \beta_6(LEV_{it}) + \epsilon_i \quad \text{Model Specification (1)}$$

$$ROA_{it} = \beta_0 + \beta_1 \ln(RCP_{it}) + \beta_2 \ln(ICP_{it}) + \beta_3 \ln(PDP_{it}) + \beta_5(SIZE_{it}) + \beta_6(SG_{it}) + \beta_7(LEV_{it}) + \epsilon_i \quad \text{Model Specification (2)}$$

$$ROE_{it} = \beta_0 + \beta_1 \ln(RCP_{it}) + \beta_2 \ln(ICP_{it}) + \beta_3 \ln(PDP_{it}) + \beta_5(SIZE_{it}) + \beta_6(SG_{it}) + \beta_7(LEV_{it}) + \epsilon_i \quad \text{Model Specification (3)}$$

$$GOP_{it} = \beta_0 + \beta_1 \ln(CCC_{it}) + \beta_2(SIZE_{it}) + \beta_3(SG_{it}) + \beta_4(LEV_{it}) + \epsilon_i$$

#### Model Specification (4)

$$ROA_{it} = \beta_0 + \beta_1 \ln(CCC_{it}) + \beta_2(SIZE_{it}) + \beta_3(SG_{it}) + \beta_4(LEV_{it}) + \epsilon_i$$

#### Model Specification (5)

$$ROE_{it} = \beta_0 + \beta_1 \ln(CCC_{it}) + \beta_2(SIZE_{it}) + \beta_3(SG_{it}) + \beta_4(LEV_{it}) + \epsilon_i$$

#### Model Specification (6)

Whereas:

GOP = Gross Operating Profit;

ROA = Return on Assets;

ROE = Return on Equity;

$\beta_0$  = The regression constant term;

$\beta_i$  ( $i = 1, 2, 3, \dots$ ) are the parameter slope

coefficients for independent and control variable;

RCP = Receivables Collection Period;

ICP = Inventories Conversion Period;

PDP = Payables Deferral Period;

CCC = Cash Conversion Cycle;

SIZE = The Size of the company;

SG = Sales growth;

LEV = The Leverage Ratio;

$\epsilon_i$  = The variable random error whose expected value

is zero;

(it):  $i = 1, \dots, N$ , refers to the number of companies,  $t =$

$1, \dots, T$ , refers to the numbers of years.

### Empirical results

#### Descriptive Statistics

Descriptive statistical summary of the study variables are shown in Table 1. The mean for all the study variables are very close to their median except for RCP, ICP, CCC, and SG. The median of the RCP is 78 days below the mean of 107 days, with a distribution highly skewed to the right. The median of ICP is 141 days slightly below the mean, indicating that most ICP values are around the average of 176 days, with a distribution skewed to the right. The median of CCC is 161 days below the mean of 215 days, with a distribution skewed to the right. The average sales growth ratio is 11.34% with a standard deviation of 53.38% and median equal to 4.16%, with a distribution highly skewed to the right.

**Table 1. Summary statistics for main study variables<sup>1</sup>**

	N	Minimum	Maximum	Mean	Median	Standard Deviation	Skweness
<i>GOP</i>	516	-0.3326	0.6630	0.0782	0.0778	0.1034	0.2527
<i>ROA</i>	516	-0.4570	0.4396	0.0320	0.0373	0.0957	-0.6790
<i>ROE</i>	516	-1.1041	0.7815	0.0348	0.0524	0.1709	-1.4976
<i>RCP</i>	516	2.758	1575.630	107.177	75.717	125.993	5.8730
<i>ICP</i>	516	10.391	836.012	176.344	141.001	133.840	1.8123
<i>PDP</i>	516	2.633	351.204	70.204	52.281	58.523	1.9153
<i>CCC</i>	516	2.596	1581.630	215.048	160.927	185.940	2.3244
<i>SIZE</i>	516	13.22	20.92	16.58	16.47	1.3746	0.5760
<i>SG</i>	516	-0.8971	6.2968	0.1134	0.0416	0.5338	5.9160
<i>LEV</i>	516	0.0109	1.2354	0.3171	0.2941	0.1999	0.7836

1: Description of study main variables

**GOP**: Gross Operating Profit, **ROA**: Return on Assets Ratio, **ROE**: Return on Equity Ratio, **RCP**: Receivables Collection Period, **ICP**: Inventories Conversion Period, **PDP**: Payables Deferral Period, **CCC**: Cash Conversion Cycle, **SIZE**: The Size of the company, **SG**: Sales Growth, **LEV**: The Leverage Ratio.

### Correlations Analysis

Table 2 results show that the correlation coefficients between profitability measures (GOP, ROA, and ROE), and all independent and control variables are significant, and as predicted by prior empirical researches. The results also show a positive significant relationship between the independent variables cash conversion cycle and inventories conversion period with a correlation coefficient of 73.5%, and a positive significant relationship between cash conversion cycle and

receivables collection period with a correlation coefficient of 56.3%. Therefore, multicollinearity has been examined as shown by the collinearity statistics in table (3), multicollinearity would be a problem if we have tolerance approach zero and VIF (variance inflation factor) approach 10 (Belsley, Kuh, and Welsch, 1980 and Myers, 1990). The table shows good indicators that multicollinearity is not a problem among the study variables.

**Table 2. Pearson correlations matrix coefficient between the main study variables<sup>1</sup>**

	<i>GOP</i>	<i>ROA</i>	<i>ROE</i>	<i>RCP</i>	<i>ICP</i>	<i>PDP</i>	<i>CCC</i>	<i>SIZE</i>	<i>SG</i>	<i>LEV</i>
<i>GOP</i>	1									
<i>ROA</i>	.817**	1								
<i>ROE</i>	.755**	.903**	1							
<i>RCP</i>	-.407**	-.346**	-.298**	1						
<i>ICP</i>	-.341**	-.231**	-.203**	.204**	1					
<i>PDP</i>	-.180**	-.168**	-.144**	.362**	.103*	1				
<i>CCC</i>	-.387**	-.274**	-.241**	.563**	.735**	-.071	1			
<i>SIZE</i>	.412**	.327**	.266**	-.345**	-.352**	-.192**	-.354**	1		
<i>SG</i>	.199**	.173**	.223**	-.098*	-.096*	.039	-.218**	.006	1	
<i>LEV</i>	-.116**	-.246**	-.251**	.054	-.089*	.155**	-.132**	.198**	.141**	1

1: Description of study main variables

**GOP**: Gross Operating Profit, **ROA**: Return on Assets Ratio, **ROE**: Return on Equity Ratio, **RCP**: Receivables Collection Period, **ICP**: Inventories Conversion Period, **PDP**: Payables Deferral Period, **CCC**: Cash Conversion Cycle, **SIZE**: The Size of the company, **SG**: Sales Growth, **LEV**: The Leverage Ratio.

\* and \*\* Correlation is significant at the 0.05 and 0.01 levels (2-tailed).

Variables	Tolerance	VIF
<i>RCP</i>	.77	1.30
<i>ICP</i>	.85	1.18
<i>PDP</i>	.84	1.19
<i>SIZE</i>	.75	1.34
<i>SG</i>	.95	1.06
<i>LEV</i>	.88	1.13

Description of study main variables:  
***RCP***: Receivables Collection Period, ***ICP***: Inventories Conversion Period, ***PDP***: Payables Deferral Period, ***SIZE***: The Size of the company, ***SG***: Sales Growth, ***LEV***: The Leverage Ratio.

Variables	Tolerance	VIF
<i>CCC</i>	.82	1.23
<i>SIZE</i>	.85	1.18
<i>SG</i>	.92	1.09
<i>LEV</i>	.94	1.07

Description of study main variables:  
***CCC***: Cash Conversion Cycle, ***SIZE***: The Size of the company, ***SG***: Sales Growth, ***LEV***: The Leverage Ratio.

**Regression Analysis**

The panel data analysis used to test the hypotheses, we examined two regression techniques, the first one is ordinary least square model (OLS) which depends on minimizing the sum of squared residuals, and it's based on the assumption that intercept and coefficient are constant over time and cross sections. Table (5) shows summary statistics for OLS regression results. The results for the first three models show that all independent and control variables, except for payable deferred period (PDP), are significant at 0.10 level, or better. The adjusted R-squared, which explain the variation in the dependent variables are 33.78%, 28.76%, and 25.74% for the first three models,

respectively. The total regression equations are significant at 0.01 significance level, with F-statistics equal 44.78, 35.66 and 30.76 for the first three models, respectively. The last three models show that cash conversion cycle and control variable are significant at 0.01 level. The adjusted R-squared are 30.01%, 26.64%, and 24.58%, respectively. The total regression equations are significant at 0.01 significance level, with F-statistics equal 56.22, 47.76 and 42.95, respectively.

However, due to the problems of heteroscedasticity, which mean changing variation after short periods of time, a second technique has been used, which is the general least squares cross-section weights as a special case of generalized regression. In this regression, the

common intercept (C) is calculated for all variables and assigned a weight. A weighted least square is obtained by first dividing the weight series by its mean, then multiplying all of the data for each observation by the scaled weight series. The scaling of the weighted series is a normalization that has no effect on the parameter results, but makes the weighted residuals more comparable to the un-weighted residuals (Raheman and Nasser, 2007). Standard errors are calculated by using white correction for heteroscedasticity (Deloof, 2003 and Zariyawati et al., 2009).

Table (6) shows the results of general least squares cross-section weights regression. All independent and control variables coefficient signs are identical for the six models, as predicted by prior empirical researches. The results for the first three models show that receivables collection period (RCP), inventories conversion period (ICP), and leverage ratio (LEV) have a significant negative relationship with all profitability measures.

In opposite to OLS regression results, payable deferred period (PDP) shows positive significant relationship with return on equity at 0.10 significance level. Model (1) and Model (2) shows that all independent and control variables, except for payable deferred period (PDP), are significant at 0.10 level, or better. Model (3) indicates that all independent variables and control variables are statistically significant with ROE 0.10 level, or better. Model (4), model (5) and model (6) shows that all independent and control variables are significant at 0.01 level.

The positive relationship between PDP and return on equity as a measure of profitability means that a delay in payments to suppliers ensure that firm can purchase more inventories, thus increasing sales levels and enhance its profits (Mathuva, 2009). These results are

consistent with (Lazaridis and Tryfonidis, 2006; Mathuva, 2009 and Dong and Su, 2010).

### Conclusion

This study examines the impact of working capital management on profitability using panel data analysis, through two regression techniques: ordinary least square and general least squares cross-section weights regression. The results show a significant negative relationship between the receivables collection period and inventory conversion period with all profitability measurements GOP, ROA and ROE.

These findings suggest that managers can create value for their shareholders by shortening the number collection payments period and inventory conversion period. In addition, the study shows that there is a significant positive relationship between payables deferral period and return on equity. This indicates that when companies take a long time to meet their obligations to suppliers they become more profitable.

Furthermore, the study results show a significant negative relationship between cash conversion cycle and profitability measures which means that shorter cash conversion cycle is more profitable.

The findings showed that all control variables have statistically strong significant relationship with GOP, ROA and ROE. Size and sales growth have a positive relationship with profitability. This implies that large companies which have more funds to give credit to customers could create more sales, thus generate more profit. Moreover, the significant negative relationship between leverage and profitability measures implies that the increase in external cost can be harmful to the profitability of companies.

**Table 5**  
**The Relationship between Working Capital Management and Profitability using Ordinary Least Square Regression.**

Variables	Model (1) (GOP)	Model (2) (ROA)	Model (3) (ROE)	Model (4) (GOP)	Model (5) (ROA)	Model (6) (ROE)
<i>Constant</i>	-0.0311 (-0.4333)	-0.1136* (-1.6499)	-0.1803 (-1.4371)	-0.2135*** (-3.3714)	-0.2381*** (-3.9668)	-0.3495*** (-3.2175)
<i>RCP</i>	-0.0276*** (-5.7257)	-0.0200*** (-4.3283)	-0.0290*** (-3.4367)	-----	-----	-----
<i>ICP</i>	-0.0248*** (-4.8851)	-0.0125** (-2.5569)	-0.0198** (-2.2234)	-----	-----	-----
<i>PDP</i>	0.0002 (0.0479)	0.0003 (0.0718)	0.0015 (0.1892)	-----	-----	-----
<i>CCC</i>	-----	-----	-----	-0.0285*** (-5.6657)	-0.0161*** (-3.3798)	-0.0256*** (-2.9592)
<i>SIZE</i>	0.0228*** (7.3059)	0.0204*** (6.7917)	0.0309*** (5.6572)	0.0285*** (9.4591)	0.0243*** (8.4978)	0.0363*** (7.0246)
<i>SG</i>	0.0344*** (4.8251)	0.0334*** (4.8427)	0.0773*** (6.1865)	0.0340*** (4.5546)	0.0337*** (4.7657)	0.0774*** (6.0525)
<i>LEV</i>	-0.1051*** (-5.3301)	-0.1567*** (-8.2769)	-0.2850*** (-8.2588)	-0.1294*** (-6.5773)	-0.1736*** (-9.3088)	-0.3087*** (-9.1466)
<i>Adjusted R-squared</i>	33.78%	28.76%	25.74%	30.01%	26.64%	24.58%
<i>F-Statistics</i>	44.78***	35.66***	30.76***	56.22***	47.76***	42.95***

Description of study main variables:  
*GOP*: Gross Operating Profit, *ROA*: Return on Assets, *ROE*: Return on Equity, *RCP*: Receivables Collection Period, *ICP*: Inventories Conversion Period, *PDP*: Payables Deferral Period, *CCC*: Cash Conversion Cycle, *SIZE*: The Size of the company, *SG*: Sales Growth, *LEV*: The Leverage Ratio.  
 The numbers in parentheses are t-values, \*\*\*, \*\*, \* Coefficient significant at the 0.01, 0.05 and 0.10 levels, respectively. (2-tailed).

**Table 6**  
**The Relationship between Working Capital Management and Profitability using General Least Squares Cross-Section Weights Regression.**

Variables	Model (1) (GOP)	Model (2) (ROA)	Model (3) (ROE)	Model (4) (GOP)	Model (5) (ROA)	Model (6) (ROE)
<i>Constant</i>	-0.0602 (-1.5049)	-0.0782* (-1.6521)	-0.1178 (-1.2419)	-0.2128*** (-6.1425)	-0.2147*** (-6.2207)	-0.3288*** (-5.9901)
<i>RCP</i>	-0.0297*** (-8.0937)	-0.0252*** (-5.6943)	-0.0359*** (-4.9538)	-----	-----	-----
<i>ICP</i>	-0.0220*** (-6.1356)	-0.0099*** (-4.1027)	-0.0128*** (-3.2344)	-----	-----	-----
<i>PDP</i>	0.0004 (0.1493)	0.0022 (0.8443)	0.0062* (1.7036)	-----	-----	-----
<i>CCC</i>	-----	-----	-----	-0.0293*** (-10.2856)	-0.0146*** (-7.2701)	-0.0189*** (-5.2158)
<i>SIZE</i>	0.0239*** (15.4404)	0.0179 *** (10.1651)	0.0240*** (6.3465)	0.0283*** (18.8901)	0.0220*** (12.8180)	0.0313*** (12.1600)
<i>SG</i>	0.0278*** (4.7012)	0.0266*** (5.0357)	0.0506*** (4.6446)	0.0302*** (4.1131)	0.0291*** (4.9318)	0.0544*** (4.6651)
<i>LEV</i>	-0.0900*** (-4.0801)	-0.1349*** (-7.5975)	-0.1718*** (-4.8062)	-0.1138*** (-5.0686)	-0.1559*** (-8.5561)	-0.1984*** (-5.4525)
<i>Adjusted R-squared</i>	41.90%	37.44%	28.86%	36.88%	34.34%	24.72%
<i>F-Statistics</i>	62.91***	52.37***	35.82***	76.23***	68.35***	43.28***

Description of study main variables:  
*GOP*: Gross Operating Profit, *ROA*: Return on Assets, *ROE*: Return on Equity, *RCP*: Receivables Collection Period, *ICP*: Inventories Conversion Period, *PDP*: Payables Deferral Period, *CCC*: Cash Conversion Cycle, *SIZE*: The Size of the company, *SG*: Sales Growth, *LEV*: The Leverage Ratio. The numbers in parentheses are t-values, \*\*\*, \*\*, \* Coefficient significant at the 0.01, 0.05 and 0.10 levels, respectively. (2-tailed).

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## العلاقة بين إدارة رأس المال العامل والربحية للشركات الصناعية المدرجة في بورصة عمان للأوراق المالية

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### ملخص

تهدف هذه الدراسة الى قياس العلاقة بين إدارة رأس المال العامل والربحية. وقد تم فحص العلاقة بين إدارة رأس المال العامل والربحية باستخدام بيانات تجميعية. تكونت عينة الدراسة من 43 شركة صناعية مدرجة في بورصة عمان في الأردن، خلال الفترة (2000-2012). أظهرت نتائج الدراسة وجود علاقة سلبية ذات دلالة إحصائية بين دورة تحويل النقدية والربحية. وهذا يدل على أن التقليل من دورة تحويل النقد تحسن ربحية الشركة. وعلاوة على ذلك، يمكن للمديرين تعظيم ثروة المساهمين من خلال تقصير فترة التحصيل وفترة التخزين. وأظهرت النتائج وجود علاقة إيجابية بين معدل الدفعات المستحقة والعائد على حقوق الملكية كمقياس للربحية. إضافة إلى ذلك، فإن الربحية تزيد مع حجم الشركة ونمو المبيعات وتتنخفض مع المديونية.

**الكلمات الدالة:** إدارة رأس المال العامل، الربحية، متوسط فترة التحصيل، متوسط فترة التخزين، متوسط فترة الذمم الدائنة، متوسط الفترة النقدية، بورصة عمان، الأردن.

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تاريخ استلام البحث 2014/6/15، وتاريخ قبوله 2014/11/25.