

Investigating the Effect of Working Capital Management Indices on Profitability in Tehran Securities Exchange Accepted Firms

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Abstract: Working capital is one of the important topics in supply chain management financially and if it is well managed, organizations can gain great benefits, especially for the smaller organizations which current assets and debts compose a great deal of their capital, working capital management and adopted policies on this field are highly important because these policies manage the financial transactions with suppliers and buyers in supply chain. This study aims to investigate the effect of working capital management indices on profitability in Tehran securities exchange firms. Data analysis was done using statistical population including 116 firms accepted in Tehran securities exchange for time period of 2006 to 2012 with whole data combination and ordinary least squares regression methods. Results indicate that there is an inverse significant relationship between cash conversion cycle and its elements including collection of receivables, inventories turnover period, and settlement of creditors and firms' profitability and firms' managers can increase their firms' profitability with decreasing the period of receivables collection and inventories turnover period desirably. Also, results of the research about creditors settlement period is that in firms with high profitability compared to firms with lower profitability the period of creditors' settlement is shorter.

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1-Introduction

Regarding the position and the importance of organizational activities, its management is specifically important. In the meantime, working capital generally dedicates a great deal of organization's capital to itself in all organizations and its management according to supply chain elements' management mechanisms is highly important. Working capital management is the optimal combination of working capital items such that maximizes the shareholders wealth.

Working capital is one of the important topics in supply chain financially, and if it is managed well, organizations can gain large benefits, especially for the smaller organizations which current assets and debts compose a great deal of their capital, working capital management and adopted policies on this field are highly important because these policies manage the financial transactions with suppliers and buyers in supply chain.

In fact, liquidity management reflects short-term assets and debts and plays an important role in business enterprises management success. If the firm cannot manage its liquidity desirably, current assets of the firm might not be responsive to the debts. As a result, firm has to find external sources to pay its short-term debts maturity. About the importance of 'Cash management' Joes (1996) believes that if firms with brilliant long-term record having precise and transparent balance sheets do not have good liquidity

management, cannot settle their debts. Liquidity cycle is a dynamic scale for working cash management which simultaneously creates a time-based scale using balance sheet and profit and loss statements (Padachi, 2006).

Cash conversion cycle is among the most important criteria of working capital evaluation. Cash conversion cycle refers to raw material purchasing and collecting the cash obtained from made products. The longer this time, the more investment in working capital will be required. Longer cash conversion cycle may increase the firm's profitability through sales increasing. Nonetheless, if investment cost of working capital is more than the investment in inventories or donating more business credits, firm's profitability may decrease (Deloof, 2003).

Generally, inventories turnover period expresses the time passes for the product to be sold. On the other hand, inventories keeping is usually done in order to compensate the products delivery fluctuations and preventing from its untimely finishing. Inventories cycle low frequencies mean relatively high investment in inventories (compared to sales). Keeping products more than the required level causes financial sources trapping in non-productive cases. On the other hand, if inventories cycle times are a lot, it means that inventories are kept in a relatively low level and can frequently cause inventories finishing and customers' losing. Principally, the profitable purpose must be a purpose

to keep inventories in a desirable level neither causes applying financial sources in non-productive cases nor losing customers. Also, results of implemented studies on working capital management indicate that there is an inverse significant relationship between inventories cycle and firms' profitability and managers can increase the firm's desirable profitability with decreasing inventories.

2- Review of the literature

Fathi and Tavakoli (2010) investigated the relationship between working capital management and financial performance and concluded that there was a significant relationship between decreasing collection of receivables' time, inventories keeping time, and consequently shorter cash cycle and firms' profitability; accordingly, with keeping cash cycle in an optimal level, firms can gain high profitability.

In his research "the effect of working capital management on firms' profitability in Tehran securities exchange firms" Mohammadi (2009) investigated 92 firms during 1995 to 2005. He used the variable of "ratio of gross profit to total assets" as firms' profitability criterion and collection of receivables period, inventories cycle, creditors' settlement period and cash conversion cycle as working capital criteria. Results of the research indicated that there was an inverse significant relationship between firms' profitability and collection of receivables, inventories cycle, creditors' settlement, and cash conversion cycle.

Bahar Moghadam and Yazdi (2010) investigated the effects of working capital management on firms' profitability. In their research information of five years (during 2004-2008) of 53 firms accepted in Tehran securities exchange was investigated and separated working capital management regarding four elements (receivables' medium term, inventories cycle period, debts payment period, and cash conversion cycle). Research findings indicate that there is a positive significant relationship between working capital management operational efficiency and profitability.

According to studies implemented in 2010, Binti Mohammad and Binti Sa'd found that there was not a significant relationship between current ratio and financial performance of 172 Malaysian firms.

In a research, Kerr, Sadka, and Sadka (2011) concluded that illiquidity has a negative significant relationship with future profits predictability in the investigated firms. In other words, firms' liquidity management problems reduce profit predictability.

In a research implemented by Anquest et al (2012) about the effect of working capital effect (cash cycle) on profitability during 1990 to 2008 in Finland stock exchange the results showed that there

is an inverse relationship between cash cycle, collection of receivables, and inventories cycle period and profitability, while this relationship is a direct one with creditors' settlement.

3- Applied models for hypotheses testing

Variables' measurement importance is that behavioral sciences researchers can investigate and test their intended questions and hypotheses using them. Variables are either independent or dependent such that independent variable is the probable or assumed reason of dependent variable and dependent variable is the probable or assume cause of independent variable (Momeni & Azar, 2002). Thus, research variables measurement procedure to separate them into independent and dependent variables is important. In this research, profitability is a dependent variable and working capital management is the independent variable.

When the purpose is to study the pure relationship between two variables, other variables which affect these two variables theoretically are entered into the model as the independent variables; accordingly, the relationship between two intended variables with eliminating the effect of other entered variables can be studied and the new entered variables are called control variables. In this research, according to Deloof (2003), Lazaridis (2006), Rahman and Naser (2007), and Anquest et al (2012), variables of current ratio, sales logarithm (firm size), and financial leverage which was expected to be effective on research results are considered as control variables.

To test research hypotheses the following models are used:

Model (1):

$$FP_{it} = \beta_0 + \beta_1 CCC_{it} + \beta_2 CR_{it} + \beta_3 DEBT_{it} + \beta_4 \log SALE_{it} + \varepsilon_{it}$$

Model (2):

$$FP_{it} = \beta_0 + \beta_1 AR_{it} + \beta_2 INVENT_{it} + \beta_3 AP_{it} + \beta_4 CR_{it} + \beta_5 DEBT_{it} + \beta_6 \log SALE_{it} + \varepsilon_{it}$$

Where FP is the financial performance (assets return), CCC is cash conversion cycle, AR is assets receivables, INVENT is the inventories keeping time, AP is accounts payable time, CR is the current ratio, DEBT is the financial leverage, SALE is the sales logarithm, and ε is the disturbing component.

4- Research hypotheses

Webster dictionary defines hypothesis as: a status or principle which is often accepted without any belief in it to be able to deduct logical results. So, its accordance with realities obvious or can be obvious can be tested.

Hypotheses are extracted and formulated from theoretical foundations and former studies as guides in the way of research conduction. In fact, hypothesis is a conjecture or conjectures about investigated statistical population characteristics and features which are confirmed or rejected after being tested. In other words, hypothesis is the knowledgeable conjecture or prediction in form of relationship between two or more variables and its accuracy is determined through scientific experimentation (Khalili, 1998).

First hypothesis: there is a significant relationship between liquidity cycle and profitability.

H0: there is not a significant relationship between liquidity cycle and profitability.

H1: there is a significant relationship between liquidity cycle and profitability.

Second hypothesis: there is a significant relationship between collection of receivables and profitability.

H0: there is not a significant relationship between collection of receivables and profitability.

H1: there is a significant relationship between collection of receivables and profitability.

Third hypothesis: there is a significant relationship between inventories cycle and profitability.

H0: there is not a significant relationship between inventories cycle and profitability.

H1: there is a significant relationship between inventories cycle and profitability.

Fourth hypothesis: there is a significant relationship between payable accounts payment and profitability.

H0: there is not a significant relationship between payable accounts payment and profitability.

H1: there is a significant relationship between payable accounts payment and profitability.

5- Research methodology

According to the objective, this research is an applied one and based on method it is a descriptive research which investigates the correlation between variables, and according to time dimension it is of post-occurrence research type.

Econometric method of this research is panel data method and it is attempted not to use sectional (annual) and time series methods individually. Panel data method is a combination of sectional and time series methods and presents more reliable results, too. During this research implementation Eviews 7 and Excel software are used.

6- Statistical population

Statistical population of the research includes Tehran securities exchange accepted firms from the

beginning of 2006 to the end of 2011 about 6 years and they have kept their membership in securities exchange. To obtain reliable results, those firms entered into stock exchange after 2006 or during the investigation period are not included in statistical population such that firms with following conditions are considered among the statistical population to estimate the research models and firms without these conditions are eliminated. Mentioned conditions are as following:

Firms should have been accepted in stock exchange before 2006 and their shares should have been transacted from the beginning of 2006.

Fiscal year end should be the end of the last month of the year.

During the research period the firm should not have fiscal year changings.

Firms should not have any transactional stoppage more than three months during the investigation.

All financial information of the firms required for the research should be accessible during the mentioned time period.

7- Research descriptive statistics

In any research, before data analysis related to research variables, a perspective of all data is drawn to determine the conditions of data based on statistical variables' view. Accordingly, in order to recognize the population of the research better and more familiarity with research variables data should be described before any data analysis. Statistical description of data is a step toward the recognition of dominant model over them and a basis to explain the relationships between variables applied in research (Khorshidi & Ghoreishi, 2002: 254).

Therefore, research variables are described at the beginning of this chapter and briefly investigated in table 1. This table includes indices to describe research variables. These indices include central indices such as mean, mode, and dispersion indices such as standard deviation, skewness, and stretching.

Mean value shows the data average. Mode shows that 50% of data are less than the medium number of the collection and 50% more than that. The closeness of mean and mode shows data symmetry. Standard deviation shows dispersion.

8- Correlation coefficient testing

To determine the degree of relationship between variables Pearson correlation coefficient has been applied. Correlation investigation is a statistical tool used to measure a degree in which a variable is linearly related to another one. Correlational relationship between research variables and their significance statistics (sig or p-value) are presented in

table 2. Correlational coefficient between the applied variables in a model should not be so much, because correlation between independent variables in a model leads to regression results' distortion. When significance coefficient is less than 5% (sig<5%) H0

is rejected and H1 is confirmed and significance of those two variables is acceptable.

As it is seen in this table, the correlation ratio between research variables indicates the significance correlation between these variables.

Table 1: descriptive statistics

Variables	Sign	Mean	Mode	Max	Min	STD
Financial performance (assets return)	ROA	0.25	0.75	1.7	-7.8	0.5
Liquidity cycle	CCC	116.8	89	787	-239	0.23
Inventories turnover time	INVENT	171.6	154	382	30	0.55
Collection of receivables' time	AR	178.47	110	645	25	0.35
Creditors payment time	AP	309.9	290	560	73	0.13
Financial leverage	DEBT	1.08	1	8	0.12	0.13
Firm size	SIZE	5.3	5	8	4	0.8
Current ratio	LIQ	1.12	0.87	2.6	0.7	0.77
Number	696					

Table 2: Pearson correlation coefficients between variables

	FP	CCC	INVEVT	ART	AP	DEBT	SIZE	CR
FP	1							
CCC	-0.17	1						
INVEVT	-0.014	0.0057	1					
ART	-0.33	0.033	0.06	1				
AP	-0.08	0.14	0.25	0.006	1			
DEBT	-0.03	-0.03	-0.0035	-0.04	-0.017	1		
SIZE	0.18	0.014	-0.24	-0.11	0.14	-0.16	1	
CR	0.092	-0.002	0.017	-0.02	0.010	-0.32	0.110	1

Table 3: F-Limer test results (sections intercepts' matching)

Chow test	Research modles	F	p-value	df	Test result	Test type
Sections intercepts are similar	Model (1)	0.23	0.9	5.68	H0 is not rejected	Pooled data model
	Model (2)	0.5	0.7	5.68	H0 is not rejected	Pooled data model

9- Hypotheses testing

First hypothesis investigates the relationship between liquidity cycle and profitability (assets turnover ratio) in Tehran securities exchange firms:

Dependent variable is profitability rate and independent variable is the liquidity cycle in this research. Regarding the results of table 2, correlation between liquidity cycle and assets turnover rate has been -0.17. Correlation coefficient is the changeability of dependent variable which can be explained by regression.

Significance test of coefficients is the same thing followed by researcher. In fact, this test determines the direction of the effect of coefficients on the dependent variable in addition to determining the significance of those coefficients. The relevant statistics to determine the coefficients significance is t-student statistics.

Results of research model and t statistics related to the first hypothesis are presented in table 4. Results of this table express that p-value for the first

hypothesis, i.e. liquidity cycle is 0.000. Regarding this fact that the considered error level for this research has been 0.01, the liquidity cycle has had a significant effect on profitability and the first research with certainty of 99% is confirmed.

Independent variable coefficient, i.e. liquidity cycle is negative. As a result, the type of relationship between liquidity and profitability is negative and direct. In other words, with increasing liquidity cycle profitability decreases.

As it is seen in table 4, F statistics is significant with certainty of 99%. Thus, research model is totally significant and dependent variable is able to explain control and independent variables. In addition, adjusted coefficient obtained from model testing has been 0.62. This shows that about 0.62 percent of dependent variables changings, i.e. the ratio of assets return resulted from independent and control variables are in the model and 0.38 percent of other changings are resulted from other factors.

Also, observing Durbin-Watson statistics values

suggest that there is not auto-correlation between model distortion components, because these values are between 1.5 and 2.5.

Table 4: 1st hypothesis testing results

Explanation	Coefficient	t-static	p-value	R-squared	Adjusted R-squared	F-static	p-value
Intercept	-7.9	-4.60	0.000	0.68	0.62	12.62	0.000
CCC	-2.21`	-4.67	0.000				
DEBT	0.05	0.23	0.8				
SIZE	1.43	4.76	0.000				
CR	0.63	1.94	0.05				
Durbin-Watson				2.14			
Observations number				696			

Regarding the results obtained from research model testing, research model coefficients are as following equation:

$$FP_{it} = -7.9 - 2.21 CCC_{it} + 0.05 DEBT_{it} + 1.43 SIZE_{it} + 0.63 CR_{it} + \epsilon_{it}$$

9-1- Hypotheses liquidity cycle components testing results

Results of second model significance testing which investigates the relationship between liquidity cycle components and profitability is presented in table 5 in form of panel data analysis.

As it is seen in table 5, F statistics is significant with certainty level of 99%. Thus, research model is

totally significant and dependent variable is able to explain independent and control variables. Additionally, adjusted determining coefficient obtained from model testing has been 0.78. This shows that about 0.78 percent of changings of dependent variable, i.e. profitability has been resulted from control and independent variables in the model and 0.22 percent from other factors.

Table 5: results of research model at level of panel data

Explanation	Coefficient	t-static	p-value	R-squared	Adjusted R-squared	F-static	p-value
Intercept	-5.84	-3.29	0.001	0.79	0.78	26.55	0.000
AR	-5.75	11.1	0.000				
INVENR	-3.37	4	0.000				
AP	-7.21	0.68	0.04				
DEBT	0.14	0.6	0.5				
SIZE	1.19	3.96	0.000				
CR	0.45	1.46	0.14				
Durbin-Watson				2.32			
Number of observations				696			

Also, observing the values of Durbin-Watson statistics suggest that there is no auto-correlation between model distortion components, because these values are between 1.5 and 2.5.

Regarding the results obtained from research model testing, research model coefficients are as the following equation:

$$FP_{it} = -5.845 - 75_1 AR_{it} - 3.371 INVENT_{it} - 7.21 AP_{it} + 0.14 DEBT_{it} + 1.19 SIZE_{it} + 0.45 CR_{it} + \epsilon_{it}$$

9-2- Second hypothesis testing

Second hypothesis investigates the relationship between collection of receivables and profitability in Tehran securities exchange.

In this hypothesis profitability (assets return) is the dependent variable, and independent variable is collection of receivables period. With respect to the

results of table 2, correlation between profitability and collection of receivables has been -0.33. Correlation coefficient is the degree of changeability in dependent variable which can be explained by regression.

Significance testing is the same thing followed by researcher. In fact, this test determines the

direction of the effect of those coefficients on dependent variable in addition to determining coefficients significance. Statistics related to coefficients significance determining is t student statistics. Research model and t statistics results about the second hypothesis are presented in table 6. Results of this table express that p-value statistics for the second hypothesis, i.e. collection of receivables is 0.000. with respect to this fact that the considered error level for this research has been 0.01, the variable of receivables' collection has had a significant effect on profitability and the second hypothesis is confirmed with certainty level of 99%.

Table 6: coefficients significance results in 2nd hypothesis

Time period	2006-2011
t	11.1
(p-value)	0.000
Coefficient	-5.75
Observations number	696
Hypothesis result	Confirmed
Type of relationship	Inverse

The second independent variable's coefficient, i.e. collection of receivables is negative. As a result, the type of relationship between this variable and profitability is an inverse and direct relationship. In other words, with increasing the period of receivables' collection profitability is decreased.

9-3- Third hypothesis testing

The third hypothesis investigates the relationship between inventories keeping period and profitability (assets return). Statistical assumptions related to this hypothesis are as following:

In this hypothesis the dependent variable is profitability and independent variable is the period of keeping the inventories. Regarding the results of table 2, correlation between inventories keeping period and profitability has been -0.14. Correlation coefficient is the changeability in dependent variable which can be explained by regression.

Table 7: 3rd hypothesis coefficients significance test results

Time period	2006-2011
t	4.3
(p-value)	0.000
Coefficient	-3.37
Observations numbers	696
Hypothesis result	Confirmed
Type of relationship	Inverse

The significance testing determines the direction of coefficient effect on dependent variable in addition

to determining the significance of coefficients. Results of research model testing and t statistics related to the third hypothesis are presented in table 7. Results of this table express that the amount of p-value for the third hypothesis, i.e. the inventories keeping period is 0.000. With respect to this fact that the considered error level for this research has been 0.01, the inventories keeping period variable has had a significant effect on profitability; accordingly, the third hypothesis is confirmed with certainty of 99%.

Inventories keeping period coefficient is negative. Consequently, the type of relationship between inventories keeping period and profitability is an inverse one. In other words, with increasing the inventories keeping period the profitability is decreased.

9-4- Fourth hypothesis testing

The fourth hypothesis investigates the relationship between payable accounts payment and profitability (assets return). Statistical assumptions related to this hypothesis are as following:

In this hypothesis the dependent variable is profitability and independent variable is the period of payable accounts payment. Regarding the results of table 2, correlation between payable accounts payment and profitability has been -0.08. Correlation coefficient is the changeability in dependent variable which can be explained by regression.

Significance testing determines the direction of coefficients' effect on dependent variable in addition to determining their significance. The relevant statistics to determine the coefficients significance is t student statistics. Results of research model and the mentioned t statistics related to the fourth hypothesis are presented in table 8. Results of this table express that p-value for the fourth hypothesis variable, i.e. payable accounts payment period is 0.04. With respect to this fact that the considered error level in this research has been 0.01. Accordingly, the payable accounts payment period is not seen in this level, but at the level of 5% and with certainty level 95% it is confirmed. So, it can be said that the fourth hypothesis has also had an effect on profitability and it is confirmed with certainty level of 95%.

Table 8: 4th hypothesis coefficient significance test results

Time period	2006-2011
t	0.68
(p-value)	0.04
Coefficient	-7.21
Observations number	696
Hypothesis result	Confirmed
Type of relationship	Inverse

Payable accounts payment variable coefficient is negative. Consequently, the type of relationship between payable accounts payment period and profitability is an inverse relationship. In other words, with increasing the period of payable accounts payment profitability is decreased.

Among the control variables there was not a significant relationship between financial leverage, current ratio and dependent variable, i.e. profitability, but there was a significant relationship between firm size and profitability with p-value of 0.000 and certainty level of 99%.

10- Conclusion

Result of regression estimation show that the independent variable coefficient, i.e. liquidity cycle at error level of 1% has been significant and the direct inverse relationship between liquidity cycle and profitability (assets return) has been confirmed. In other words, the research findings indicated the confirmation of this hypothesis. As a result, it can be claimed that there is a significant relationship between assets return and profitability. Obtained results from this hypothesis are consistent with results of studies implemented by Fathi and Tavakoli (2009), Mohammadi (2009), Yaghubnejad et al (2010), Anand and Prakash Gupta (2002), Riley (2005), Deloof (2003), Lazaridis and Tryfonidis (2006), Padachi (2006), Solano et al (2007), Rahman and Naser (2007), and Inquest et al (2012), but it is not according to the results of Afza and Nasir (2007).

Regression model estimation results show that the independent variable coefficient of the second hypothesis, i.e. collection of receivables has been significant at certainty level of 1% and has had a direct negative relationship with profitability. Results of this hypothesis are consistent with results of research implemented by Fathi and Tavakoli (2009), Mohammadi (2009), Yaghubnejad et al (2010), Anand and Prakash Gupta (2002), Riley (2005), Deloof (2003), Lazaridis and Tryfonidis (2006), Padachi (2006), Solano et al (2007), Rahman and Naser (2007), and Inquest et al (2012), but it is not according to the results of Afza and Nasir (2007).

The results of model's regression show that the third hypothesis independent variable coefficient, i.e. inventories keeping time period has been significant at the error level of 1% and has had an inverse negative relationship with profitability. In other words, research findings have confirmed this hypothesis. As a result, it can be claimed that there is a significant relationship between inventories keeping time period and profitability. Results of this hypothesis are consistent with results of research implemented by Fathi and Tavakoli (2009), Mohammadi (2009), Yaghubnejad et al (2010),

Anand and Prakash Gupta (2002), Riley (2005), Deloof (2003), Lazaridis and Tryfonidis (2006), Padachi (2006), Solano et al (2007), Rahman and Naser (2007), and Inquest et al (2012), but it is not according to the results of Afza and Nasir (2007).

Results of model regression show that fourth hypothesis independent variable coefficient, i.e. payable accounts payment has been significant at the error level of 5% and has had an inverse negative relationship with profitability. In other words, research findings have confirmed this hypothesis. So, it can be claimed that there is a significant relationship between payable accounts payment time period and ratio of assets return. Results of this hypothesis are consistent with results of research implemented by Fathi and Tavakoli (2009), Mohammadi (2009), Yaghubnejad et al (2010), Anand and Prakash Gupta (2002), Riley (2005), Deloof (2003), Lazaridis and Tryfonidis (2006), Padachi (2006), Solano et al (2007), Rahman and Naser (2007), and Inquest et al (2012), but it is not according to the results of Afza and Nasir (2007).

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