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**Relationship between Working Capital, Operating Cash Flows and Operating Income: Empirical Evidences from Listed Firms in Tehran Stock Exchange**

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## **Relationship between Working Capital, Operating Cash Flows and Operating Income: Empirical Evidences from Listed Firms in Tehran Stock Exchange**

### **Abstract**

The main purpose of this research is to investigate the relationship between working capital, operating cash flow and operating income, in the companies that listed in Tehran Stock Exchange. Panel analysis is applied to sample of 52 companies during the period 2000-2009. The results show that there is a positive relationship between working capital and operating profit. But there is not meaningful relationship between operating cash flows and working capital.

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### **Introduction**

In general, working capital items are considered to economic units and have the significant role in financial decisions. The importance of working capital as a specialized field of financial management will increase (Nikoomram, 2007, p.16). Working capital are different definitions but they represent a unit concept: Amount of current assets, which was produced from long-term financing (Talebi, 1998, p. 6). Traditionally, the concept of working capital is the current assets (Shabahang, 2001, p. 67).

As a principle there is the relationship between revenues, expenses, assets and current liabilities, that this principle inevitably is related to the accrual method and the changes of each factors effect on other factors (Namazi and Afsar, 2006, pp. 137-138). On the other hand, working capital represents the difference between current assets and liabilities ,also operating cash flows and operating income somehow affected assets and current liabilities,

could have said that working capital on operating cash flows and operating income is impressive. Understand how working capital changes over time in terms of management view, is important. Because there is many ways that a company invest its working capital and especially its cash, is signs of how manage its asset (Ibid, p. 159). In addition, banks and other creditors to grant facilities to the firms, their liquidity ratios and current debt repayment ability are considered. So a strong working capital management and liquidity levels to control the company is very important and necessary (Nikoomaram et al., 2006, p.12).To improve the working capital, economic units can use various strategies so it impacts on liquidity levels and profitability. This strategies that determine risk and return, are conservative and aggressive strategies that according to the condition of a firm, will choose a suitable strategy (Sagan, 1955, P.42). Iranian researchers have done a little research about working capital. This issue could be triggered that company executives are not too

much attention to working capital issue. Considering the changes in working capital is important, because proper management of working capital could help the company in creating profitability and operational cash flows. Thus, this research going to study the impact of working capital on the operating income and operating cash flows.

## **Literature Review**

The results of Meltzer (1960), suggest that companies that have low liquidity during the financial dilemma facing attempted to discount accounts receivable drawn in companies that have high liquidity, are not doing such work. The cash assets of such companies as collateral are using short-term loans, due to increased current liabilities, working capital reduction will be. Smith (1980), found that working capital management issue is very important because it has been importance impact on the profitability, risk and firm value. He also observed that working capital management is facing difficulties, that there is for management of current assets, current liabilities, and the relation between them.

Teruel and Solano (2005) studied the effect of working capital management on profitability of Spanish small companies. The results have shown a meaningful relationship between working capital management and profitability of these companies directly.

Shin et al. (1998), observed the strong negative correlation between the cash conversion cycle and profitability of American companies for the years 1975 through 1994. The results also indicated a significant negative correlation between the duration of collecting accounts receivable and operating income from sales and operating cash flow. Thus the short cash conversion cycle and accounts receivable collection period will be improved corporate performance and operating cash flow.

Lazaridis and Tryfonidis (2006) studied relationship between working capital management and corporate profitability of companies that listed in the Athens Stock

Exchange. The research has been conducted on the basis of regression analysis ,with a statistical sample of 131 firms during 2001-2004. The result indicated that there was a statistical significance between profitability, measured through gross operating profit, and the cash conversion cycle.

Padachi (2006) studied the effect of working capital on the firm's performance in the New York Stock Exchange for a period of seven years. Based on his view, cash is most important component of working capital. If liquidity of firm be low, the borrowing is inevitable. Adequate liquidity is leading to increase profitability, but if the cost of working capital in excess of its benefits, this trend is reversed.

Afza and Nazir (2009) studied the effect of aggressive working capital management policies on profitability. Samples include data from 204 Pakistan companies that were divided into 16 industry groups in during the period 1998 to 2005. They found that there is a negative relationship between profitability with the degree of aggressive working capital and firms financial policies. Also firms that used of the aggressive working capital policy, the negative returns were reported.

Valipour and Hosseini (2009) studied the relationship between working capital policy and profitability by using data from the 75 companies that listed in Tehran Stock Exchange for the period 2000 to 2007. They found that working capital policy has a significant impact on the profitability of stock. Their results also showed that firms with different working capital policies have different profitability. In other words, companies that have more conservative policies, be more profitably. Against companies that have a aggressive policy, have the lowest profitability.

Nobanee and Al Hajjar (2009) examined the relationship between working capital management, cash flow and operating performance. Results have suggested that, managers with shorten the cash conversion cycle and the duration of collecting accounts receivable, can increase their cash flow and profitability. The results also showed that with

shorten the inventory conversion period and the period of long term accounts payable, they can reduce profitability and cash flow. Al Taleb et al. (2010) examined the efficiency of working capital policies by using data from 82 industrial companies from Amman Stock Exchange for the period 2005-2007. The results showed that managers have less attention to the working capital management than the capital budgeting and capital structure in the financial management decisions. The results also showed that lack of working capital management efficiency led to excessive investment in working capital and reduce the profitability of the firm. On the other hand, lack of efficient working capital management cause to inadequate amounts of working capital and the financial deficit and the company is under financial pressure.

Nilsson (2010), studied the effect of firm characteristics on the working capital management, also examined the relationship between these characters and cash conversion cycle in Swedish companies in the period 2007 to 2008. He studied the impact of company characteristics on working capital management .Cash conversion cycle is also a criterion to evaluate working capital management. Company characteristics include profitability, operating cash flow, firm size, sales growth, current ratio, quick ratio and debt ratio. Pearson correlation and regression have been used to test the hypothesis. Results suggested that profitability, operating cash flow and sales

### **Research methodology**

This research studied the impact of working capital on the operating income and operating cash flows.The results of this study can be used by managers, investors and other users. The research has been conducted on the basis

growth are affected on working capital management. Other results have indicated that there is a negative relationship between profitability and cash conversion cycle. The results also showed a negative relationship between the cash conversion cycle with firm size, sales growth and operating cash flow.

Nobanee and Al Hajjar (2009) studied the relationship between working capital management and profitability in the Tokyo Stock Exchange. They used a statistical sample of 2123 data from the Japanese companies for the years 1990 through 2004.The results indicated that managers can increase the profitability of the company to shorten the cash conversion cycle and accounts receivable collection period. The results also showed that managers can increase their profitability with long term payment debt. But when you stretch out the payment period, managers should treat carefully, because this issue could damage to the credit reputation and profitability of firm, in the long run.

Zubairi (2010) examined the relationship between working capital and profitability for 13 active companies in Karachi Stock Exchange during the period 2000 to 2008. Results showed that companies can increase profitability by increasing the current assets and reduce the current debt. He believed that, working capital policy is effective on profitability of firm.

correlation method to test the relationship between working capital ,operating cash flows and profitability for 52 companies listed in Tehran Stock Exchange during the period 2000-2009.Also according to the data structure, panel analysis is used. To test the research hypotheses, This study follows the model of Nobanee and Al Hajjar (2009):

$$OI = \alpha + \beta_1 wc_{it} + \beta_2 sg_{it} + \beta_3 qr_{it} + \beta_4 struct_{it} + \beta_5 cr_{it} + \epsilon_{it} \quad (1)$$

$$Ocf = \alpha + \beta_1 wc_{it} + \beta_2 sg_{it} + \beta_3 qr_{it} + \beta_4 struct_{it} + \beta_5 cr_{it} + \epsilon_{it} \quad (2)$$

Where:

*OI*: Operating profit in year t

- WC<sub>it</sub>**: Amount of working capital in year t
- SG<sub>it</sub>**: Sales growth in t
- QR<sub>it</sub>**: Annie than in years t
- struct<sub>it</sub>**: Ratio of capital structure in the year t
- CR<sub>it</sub>**: The current ratio in year t
- Ocf**: The operating cash flow in year t end
- ε**: Error

### **Research hypotheses**

In order to achieve the main goals of research, two hypotheses are presented as follows:

**First hypothesis:** there is significant relationship between working capital and operating profit.

**Second hypothesis:** there is significant relationship between working capital and operating cash flows.

Research variables are divided into three groups: independent, dependent and control variables. Independent variable in this study is working capital. Operating cash flow and operating profit are the dependent variables. Control variables include the ratio of capital structure, sales growth, current ratio and quick ratio.

### **Statistical population and sampling**

In order to study, statistical sample of listed companies in Tehran Stock Exchange has been selected. The sample includes companies that have set the following conditions:

1. Prior to 2000 are listed in Tehran Stock Exchange;
2. In order to increase comparability, the period led to the end of year;
3. Companies should not have changed its fiscal year, during the years studied;
4. Banks, financial institutions and investment, were removed;
5. Financial information needs for research are available. According to the mentioned

conditions, statistical sample is 52 firms that listed in Tehran Stock Exchange.

### **Empirical results**

When the panel analysis is used, different tests should be conducted to detect the appropriate estimation method. The most common, these tests include Chow test, Breusch - Pagan test and Hausman test. Since the proposed models are as multivariate, before estimating the final model, the correlation matrix should be calculated, to assess relationships between variables.

#### **The first hypothesis test**

The results of Chow test , Breusch- Pagan test and Hausman test are as follows:

#### **Chow test**

Chow (1960), introduced the test for choosing between ordinary least squares method for data merging and fixed effects models. The model assumptions include (Baltagi, 2005):

$$H_0 : \mu_1 = \mu_2 = \dots = \mu_{n-1} = 0$$

$$H_1 = \text{Not}$$

$\mu_i$  is a dummy variable coefficient in fixed effects models. In this test, the hypothesis of zero, indicating similar coefficients and width of the source is. Therefore reject the zero hypothesis, indicate the use of panel data method and non-rejection of zero hypothesis, meaning that should be used ordinary least squares method with merged data. The results of this test are shown in Table (1), indicate that the zero hypothesis is rejected. Therefore should be used panel data methods, with fixed effects.

**Table-1** Chow Test

Effects Test	Statistic	d.f.	Prob.
Cross-section F	56.482352	(51,454)	0.0000
Cross-section Chi-square	1036.88561	51	0.0000

**Table-2** Breusch and Pagan Test

Estimated results	Var	sd=sqrt(Var
OI	3.44	185369.6
e	4.60	67851
u	2.55	159790.1
Test: Var(u) = 0 Chi (1) = 1433.03 Prob > Chi 2 = 0.0000		

**Table-3** Hausman Test

Test Summary	Chi-sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0	5	1

**Breusch- Pagan test**

Breusch and Pagan in 1980 used the Lagrange coefficient (LM) to test the merged data model vs. random effects model, which is obtained through the method maximum likelihood estimation. The assumptions test is as follows (Baltagi, 2005):

$$H_0 : \delta_\alpha^2 = 0$$

$$H_1 : \delta_\alpha^2 > 0$$

In this test, non-rejection of zero hypothesis means that it is better to use the merged data model. In contrast, rejected the hypothesis of zero means that it is better to use the merged data model, with random effects. The results of this test in Table(2) indicate the rejection of zero hypothesis . therefore use of panel data, with random effects is necessary.

**Hausman Test**

According to the results of Chow test and Breusch – Pagan test, Hausman test is used to test the research hypothesis. Assumptions of this test include (Baltagi, 2005):

$H_0$ : Estimate the model with fixed effects and estimate the model with random effects are consistent (there are no differences)

$H_1$ :The model with fixed effects and rejection of models with random effects.

The results of the test Hausman is shown in Table (3).Base on these results, zero hypothesis is rejected and the model estimation method, with fixed effects is selected.

**Correlation matrix**

Because of understanding the relationship between independent variables and their relationship with the dependent variable ,before estimating the first model, correlation matrix should be calculated. In this case , there is a high correlation between independent variables and the model has a collinear problem. To avoid this problem, the independent variables that have a strong relationship with each other, are identified, and an independent variable, which has weak correlation with the dependent variable, can be removed. The results of Correlation matrix are shown in table( 4 ):

**Table-4** Correlation matrix

		OI	WC	SG	QR	STRUCT	CR
OI	Pearson Correlation	1	.074	-.008	.020	-.180**	-.007
	Sig. (2-tailed)		.093	.855	.641	.000	.870
	N	520	520	520	520	520	520
WC	Pearson Correlation	.074	1	.011	.317**	-.210**	.381**
	Sig. (2-tailed)	.093		.807	.000	.000	.000
	N	520	520	520	520	520	520
SG	Pearson Correlation	-.008	.011	1	-.017	-.015	.010
	Sig. (2-tailed)	.855	.807		.700	.740	.821
	N	520	520	520	520	520	520
QR	Pearson Correlation	.020	.317**	-.017	1	-.491**	.773**
	Sig. (2-tailed)	.641	.000	.700		.000	.000
	N	520	520	520	520	520	520
STRUCT	Pearson Correlation	-.180**	-.210**	-.015	-.491**	1	-.527**
	Sig. (2-tailed)	.000	.000	.740	.000		.000
	N	520	520	520	520	520	520
CR	Pearson Correlation	-.007	.381**	.010	.773**	-.527**	1
	Sig. (2-tailed)	.870	.000	.821	.000	.000	
	N	520	520	520	520	520	520
**. Correlation is significant at the 0.01 level (2-tailed).							

**Table-5** Regression of Stock Return

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4612.981	4423.091	1.042931	0.2975
WC	0.166062	0.019349	8.582400	0.0000
OI(-1)	0.978102	0.017250	56.70057	0.0000
R-squared	0.875164	Mean dependent var		60667.13
Adjusted R-squared	0.874627	S.D. dependent var		190882.5
S.E. of regression	67587.74	Sum squared resid		2.12E+12
F-statistic	1629.944	Durbin-Watson stat		2.060747
Prob (F-statistic)	0.000000			

Notes: Dependent variable: OI; Model: Total; Method: Panel EGLS; Cross-section random (dummy variables); Period random (dummy variables); Prob., probability; SD, standard deviation; SE, standard error.

The results show significant positive correlation between working capital, sales growth, quick ratio, current ratio and capital structure, with operating profit at 99% level of confidence. Among the independent variables, sales growth (-0.008) and Current ratio (-0.007) have the weakest relationship. Other notable point of table (4) is a strong significant relationship

between working capital, current ratio and quick ratio. Since, working capital variable has the highest correlation with the dependent variable in estimating the final model, the model is compiled.

### **The first hypothesis test**

According to the results of the above test, the following model to test the relationship between working capital and operating income are estimated. Final model as follows:

Based on the information table ( 5 ), P-Value related to F, is equal to zero. This means that the model can be estimated linearly. The results also show that there is a meaningful and positive relationship between working capital and operating profit. Calculated  $R^2$  is equal to 0.87. This means that 87% of the variation in the dependent variable can be explained by changes in the working capital. In order to solve the problem of serial correlation, the estimation model has been used lag variable. Durbin-Watson is equal to 2.06 that show the lack of serial correlation problem, in the estimated model.

### **Empirical result for test of second hypothesis**

In this section we will test the relationship between working capital and operating cash flow. To test this relationship, like the first hypothesis test, is required to perform some primary tests. Required test results are as follows:

#### **Chow test**

In this test, the hypothesis of zero, indicating similar coefficients and width of the source is. Therefore reject the zero hypothesis, indicates the use of panel data method and non-rejection of zero hypothesis, means that should be used ordinary least squares method with merged data. The results of this test are shown in Table (6). These results indicate that the zero hypothesis is rejected. Therefore should be used panel data methods, with fixed effects.

#### **Breusch - Pagan Test**

In this test, the non-rejection zero hypothesis means that it is better to use the merged data model. In contrast, rejected the hypothesis of zero means that it is better to use the merged data model, with random effects. After this test the results of this test are shown in Table (7).Base on these results zero hypothesis is rejected and use of panel data with random effects is

### **Hausman test**

The results of the test Hausman is shown in Table (8). Because of zero hypothesis is rejected, the model estimation method, with fixed effects is selected.

### **Correlation matrix**

For estimating the second model, the correlation matrix is calculated .The results are shown in table (9):

The results indicate there is only a meaningful negative correlation between working capital (-0.163) and capital structure (-.0152) with operating cash flow at 99% level of confidence. Therefore only these two variables can be entered in the final model.

Based on the information in the table(10), P-Value related to F, is equal to zero. This means that the model can be estimated linearly. Also according to t statistics and P-Value related to the coefficients of capital structure and lag variable, these two variables, have meaningful relationship with working capital. Results also show that there is no meaningful relationship between working capital and operating cash flow. Durbin-Watson is equal to 2.27. This means lack of serial correlation problem, in the estimated model.

### **Conclusion**

Results from the first hypothesis test show that there is a significant relationship between working capital and operating profit. The results also show a strong positive relationship between working capital and profitability of the company. Due to these results, focus on working capital management affect profitability of companies. Results of this study are similar to other studies such as Shin and Soenen (1998), Lazaridis and Tryfonidis (2006), Nobanee and Alhajar (2009), Zubairi (2010) and Valipour and Hosseini (2009).

Results from the second hypothesis test show that there is no significant relationship between working capital and operating cash flows. These results can be due to the use of total current assets and current liabilities in calculation of working capital. This means that if the components of working capital were used,



perhaps the results could be different. Although the results of Nobanee's and Alhajar's research (2009) had shown that there is a significant relationship between working capital and operating cash flows, but such a relationship was not confirmed in this study.

**Table-6** Chow test

Effects Test	Statistic	d.f.	Prob.
Cross-section F	13.965896	(51,456)	0.0000
Cross-section Chi-square	489.204835	51	0.0000

**Table-7** Breusch - Pagan Test

Estimated results	Var	sd=sqrt(Var
Ocf	1.58	125838.9
e	6.60	81252.78
U	8.21	90619.34
Test: Var(u) = 0 Chi (1) = 624.55 Prob > Chi 2 = 0.0000		

**Table- 8** Hausman Test

Test Summary	Chi-sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000	3	1

**Table (9)** correlation matrix

		OCF	WC	SG	QR	STRUCT	CR
OCF	Pearson Correlation	1	-.163**	-.017	.007	-.152**	.012
	Sig. (2-tailed)		.000	.694	.867	.001	.787
	N	520	520	520	520	520	520
WC	Pearson Correlation	-.163**	1	.011	.317**	-.210**	.381**
	Sig. (2-tailed)	.000		.807	.000	.000	.000
	N	520	520	520	520	520	520
SG	Pearson Correlation	-.017	.011	1	-.017	-.015	.010
	Sig. (2-tailed)	.694	.807		.700	.740	.815
	N	520	520	520	520	520	520
QR	Pearson Correlation	.007	.317**	-.017	1	-.491**	.775**
	Sig. (2-tailed)	.867	.000	.700		.000	.000
	N	520	520	520	520	520	520
STRUCT	Pearson Correlation	-.152**	-.210**	-.015	-.491**	1	-.544**

	<b>Sig. (2-tailed)</b>	<b>.001</b>	<b>.000</b>	<b>.740</b>	<b>.000</b>		<b>.000</b>
	<b>N</b>	<b>520</b>	<b>520</b>	<b>520</b>	<b>520</b>	<b>520</b>	<b>520</b>
<b>CR</b>	<b>Pearson Correlation</b>	<b>.012</b>	<b>.381**</b>	<b>.010</b>	<b>.775**</b>	<b>-.544**</b>	<b>1</b>
	<b>Sig. (2-tailed)</b>	<b>.787</b>	<b>.000</b>	<b>.815</b>	<b>.000</b>	<b>.000</b>	
	<b>N</b>	<b>520</b>	<b>520</b>	<b>520</b>	<b>520</b>	<b>520</b>	<b>520</b>
<b>** . Correlation is significant at the 0.01 level (2-tailed).</b>							

**1. Test of second hypothesis**

According to the results of required primary tests, the final model is estimated as follows:

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	52626.08	18293.74	2.876727	0.0042
WC	-0.002840	0.031112	-0.091284	0.9273
STRUCT	-44615.67	24553.19	-1.817103	0.0698
OCF(-1)	0.664199	0.040873	16.25018	0.0000
R-squared	0.401319	Mean dependent var		54976.44
Adjusted R-squared	0.396147	S.D. dependent var		130442.1
S.E. of regression	101364.0	Sum squared resid		4.76E+12
F-statistic	77.59166	Durbin-Watson stat		2.277017
Prob(F-statistic)	0.000000			

Notes: Dependent variable: OCF; Model: Total; Method: Panel EGLS; Period random (dummy variables); Prob., probability; SD, standard deviation; SE, standard error.

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