THE MODERATING EFFECT OF CASH HOLDING ON CURVATURE RELATIONSHIP OF WORKING CAPITAL AND PROFITABILITY: EMPIRICAL EVIDENCE OF THE COMPANIES LISTED ON TEHRAN STOCK EXCHANGE (TSE)

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Abstract: There are various evidences regarding the relationship between working capital and performance. Extra investment in working capital has positive effect on company namely for the companies with low working capital. This is because working capital allows the companies to increase sale and profitability and develop. On the other hand, increase of working capital requires excess financing and it includes funding and opportunity costs. The companies with high working capital in their balance sheet are faced with high interest cost and bankruptcy risk. The reduction of net working capital requires the increase of its cash holding (e.g. to cover the trading) and there is as substitute relationship between net working capital and cash holding. The present study evaluates non-linear relationship of working capital and profitability and moderating effect of cash holding on the mentioned relationship. To do this, the data of 117 companies in TSE during 2010-2014, multivariate regression models and pooled data are used. The results showed that there was a direct, significant relationship between the change in working capital and change of profitability of companies listed on TSE. Cash holding reduced the direct relationship between working capital and profitability of companies listed on TSE.

Keywords: Working capital, Cash holding, Profitability.

1. INTRODUCTION

Working capital management of a company is an important field in financial management. This includes taking decisions about price and combination of current assets and funding method of these assets. Working capital management effectively follows growth opportunities to allocate the money optimally and to use the opportunities well. The working capital management process includes decisions about various aspects of cash holding investment, keeping definite level of inventory, management of received and paid accounts (Gitmen, 2009). Working

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capital management is a concept observed in all corporate financial books and this shows its importance for companies. At the end of 2011, total investment of US companies in working capital (e.g. inventory plus accounts received) was about 4.2 trillion $ and almost 24% of total sale and more than 18% of book value of their assets were dedicated. About 40% of working capital are financed by accounts paid and led into a compressive investment in net operating working capital as 2.5 trillion % (Aktas et al., 2014). The existing literature presents some theoretical reasoning to perceive the relationship between working capital and company performance. Thus, it is expected that overinvestment in working capital has positive effect namely for the companies with low working capital. This is because the working capital allows the companies to develop using sale and profitability.For example, the increase of inventory can reduce supply cost and is a shield to volatilities of price and reduce loss due to potential volatilities of demand (e.g. Blinder and Maccini, 1991; Fazzari and Petersen 1993). The companies with high working capital in their balance sheet have high interest cost and bankruptcy cost. The question is raised in the present study whether working capital is effective on performance and profitability of companies listed on TSE? Is there any optimal point in investment in working capital management? According to Wang et al., (2013), reduction of net working capital of companies requires the increase of its cash holding (e.g. to cover the trading) and there is a substitute relationship between net working capital and cash holding of company. It is expected that cash holding can moderate the relationship between working capital and company profitability. The present study raised the question whether cash holding is effective on the relationship between working capital and profitability of companies listed on TSE?

2. THEORETICAL BASICS

Working capital of a company is the sum of investment on current assets and if we deduct current debts, net working capital is achieved (Jahankhani and Parsayian, 2001). The definition of working capital in accounting is current assets minus current debts and indicates the investment of company in cash flow, sold securities, accounts received and holding of goods minus current debts. Some authors define working capital as the sum of current assets and debts and its difference is net working capital. In other words, net working capital indicates the current assets in excess to current debts and it is supported of long-term loan and shareholders' equity (Shabahang, 2008). One of the important indices in evaluation of financial performance is profitability and liquidity indices. Profitability refers to a company ability to achieve income. Profitability is the final result of all plans and financial decisions of company and give the last responses about the management of company to analysts (Tariverdi, 2012). Cash flow in accounting standard NO. 2 of Iran refers to the cash holding and demand deposit of financial institutes and banks as Rial and exchange (e.g. short-term deposits without maturity) (The committee of accounting

standards, 2010). In addition, various studies have shown that cash flow policies of companies manage working capital in the form of received accounts of customers, cash holding, paid cash to suppliers and have wide cohesion with performance improvement and profitability of company (Stewart, 1995; Farris and Hutchison, 2002, 2003).

3. REVIEW OF LITERATURE

Muhammad et al., (2016) in a study "The Effect of Working Capital Management on Corporate Profitability: Evidence from Nigerian Food Product Firms" found a direct and significant relationship between average claim collection, current ratio and firm size with its profitability and a reverse and significant relationship between inventory turnover and average debt payout with profitability.

Umoren and Udi (2015) in a study "Working Capital Management and the Performance of Selected Deposit Money Banks in Nigeria" evaluated the effect of working capital management on liquidity and profitability of selected deposit banks of Nigeria. The results showed that there was an inverse and significant relationship between cash flow conversion cycle and profitability and there was an inverse and significant relationship between debt payout and liquidity. The claim collection period has direct and significant relationship with liquidity. Yahyazadefar et al., (2014) investigated the relationship between working capital management and profitability of TSE companies. The results showed that there was no relationship between working capital management and profitability and the results of study regarding three industries of car, chemical products and non-metal mineral products showed that only in chemical products industry, there was a relationship between working capital management and profitability. Vaez et al., (2014) investigated the relationship between ownership concentration and board structure with working capital management efficiency. The results showed that ownership concentration had negative and significant relationship with inventory conversion and cash flow conversion cycle but there was no significant relationship between claim collection period and debts payout period.

4. STUDY HYPOTHESES

Main hypotheses:

1. There is a non-linear relationship between working capital and profitability of company.

2. Cash inventory is effective on the relationship between working capital and profitability of company.

Sub-hypotheses:

1.1 If working capital of company is smaller than average level, there is a direct association between working capital and profitability of company.

1.2 If working capital of company is bigger than average level, there is an inverse association between working capital and profitability of company.

1.3 If working capital of company is smaller than average level, there is a significant difference between working capital and profitability based on cash holding of company.

If working capital of company is bigger than average, there is an inverse and significant relationship between working capital and profitability based on cash holding.

5. MODELS AND VARIABLES OF STUDY

To test the first hypothesis, the following model is used (Mun and Jang, 2015).

$$ROA_{i,t} = \beta_0 + \beta_1 WCR_{i,t} + \beta_2 WCR^2_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 GROWTH_{i,t} + \beta_5 GDP_t + \beta_6 LEV_{i,t} + \varepsilon_{i,t}$$

$$\Delta ROA_{i,t} = \beta_0 + \beta_1 \Delta WCR_{i,t} + \beta_2 \Delta WCR^2_{i,t} + \beta_3 \Delta SIZE_{i,t} + \beta_4 \Delta GROWTH_{i,t} + \beta_5 \Delta GDP_t + \beta_6 \Delta LEV_{i,t} + \varepsilon_{i,t}$$

Where,

Dependent Variable:

$ROA_{i,t}$ = Profitability of company i in year t as the earnings before interest and tax deduction to total assets of company (Mun and Jang, 2015).

Independent Variable:

$WCR_{i,t}$ = Working capital of company i in year t as equal to cash holding minus current debt plus accounts received plus inventory minus paid accounts divided by sale income.

Control Variables:

$SIZE_{i,t}$ = Firm size i in year t as natural logarithm of total assets of company.

$GROWTH_{i,t}$ = Company growth i in year t as equal to sale income of year t minus sale income of year $t – 1$ divided by sale income of year $t – 1$ of company.

GDP_t = Gross domestic product of country in year t

$LEV_{i,t}$ = Financial leverage of company i as equal to the debts to assets ratio

For second hypothesis test, the following model is used (Mun and Jang, 2015).

$$\text{ROA}_{i,t} = \beta_0 + \beta_1\,\text{WCR}_{i,t} + \beta_2\,\text{WCR}^2_{i,t} + \beta_3\,\text{SIZE}_{i,t} + \beta_4\,\text{GROWTH}_{i,t} + \beta_5\,\text{GDP}_{i,t}$$
$$+ \beta_6\,\text{LEV}_{i,t} + \beta_7\,\text{CASHR}_{i,t} + \beta_8\,\text{WCR*CASHR}_{i,t} + \beta_9\,\text{WCR}^2\text{*CASHR}_{i,t}$$
$$+ \varepsilon_{i,t}$$

$$\Delta\text{ROA}_{i,t} = \beta_0 + \beta_1\,\Delta\text{WCR}_{i,t} + \beta_2\,\Delta\text{WCR}^2_{i,t} + \beta_3\,\Delta\text{SIZE}_{i,t} + \beta_4\,\Delta\text{GROWTH}_{i,t}$$
$$+ \beta_5\,\Delta\text{GDP}_{i,t} + \beta_6\,\Delta\text{LEV}_{i,t} + \beta_7\,\Delta\text{CASHR}_{i,t} + \beta_8\,\Delta\text{WCR*}\Delta\text{CASHR}_{i,t}$$
$$+ \beta_9\,\Delta\text{WCR}^2\text{*}\Delta\text{CASHR}_{i,t} + \varepsilon_{i,t}$$

Where,

Dependent Variable:

$\text{ROA}_{i,t}$ = Profitability of company i in year t

Independent Variables:

$\text{WCR}_{i,t}$ = Working capital of company i in year t

$\text{CASHR}_{i,t}$ = Cash holding of company i in year t equal to cash holding ratio to assets. Of multiplication of working capital variables by cash holding are used for second hypothesis test. For second hypothesis test, β_8 and β_9 coefficients are used.

Control Variables:

$\text{SIZE}_{i,t}$ = Firm i size in year t

$\text{GROWTH}_{i,t}$ =Growth of company i in year t

GDP_t = Domestic growth product in year t

$\text{LEV}_{i,t}$ = Leverage of company i in year t

6. STUDY METHODOLOGY

This study is applied in terms of purpose as the results can be used in decisions of managers and investors. In terms of inference method of study hypotheses, it is a correlation design and it is used to detect the relationship between study variables and regression techniques. As via testing the data, we achieve results, our study is positive theory group. The study population is all companies listed on TSE during 2010-2014. In this study, the sample is selected via systematic elimination of study population. The sample consists of all existing companies in study population with the following criteria: (1) During the study, they are in stock market. (2) During the study period, there is no change in fiscal year. (3) It is not as active companies in financial activities including investment, banks, insurance and financial institutes. As these institutes are different in terms of activity nature, their revenue is based on investment and dependent upon the activity of other companies. It is different by

nature with other companies and they are eliminated. (4) The data for study variables exist during 2010-2014. (5) Their fiscal period leads to 12.29 of each year to put the data beside each other and be used as panel. Considering the mentioned conditions leads to selection of 117 companies as study sample. For data collection, library and documents are used. To achieve the data for study hypothesis processing, the data in Rahavard novin software and financial statements of companies listed on TSE are used. The descriptive statistical indices in this study are mean, median, standard deviation, maximum and minimum. In this study, for hypothesis test, multi-variate linear regression model is used. The applied study method in this study is pooled data method. At first, pooled data method and relevant tests are explained. Then, tests of significance of entire model and significance of independent variables are explained. Finally, we explain the tests of classic regression hypotheses. It is worth to mention that in this study for data analysis, Eviews 9, version 9 is applied.

7. ANALYSIS OF STUDY HYPOTHESES

At first, we investigate the Pearson correlation of study variables. The results of Pearson correlation test are shown in Table 1. As shown in the Table, in Pearson correlation, there is a direct and significant correlation between profitability and working capital, firm size, company growth and cash holding and there is an inverse and significant relationship between profitability and financial leverage.

Table 1
Pearson correlation

Cash holding	Leverage	GDP	Growth	Size	Working capital	Profitability	Variable
**0.261 0.000	**0.625- 0.000	0.029 0.479	**0.26 0.000	**0.114 0.006	**0.439 0.000	1	*Profitability*
**0.264 0.000	**0.557- 0.000	0.013- 0.743	**0.123 0.003	**0.136- 0.001	1		*Working capital*
*0.086- 0.04	0.006 0.881	0.06- 0.147	0.035 0.398	1			*Size*
**0.132 0.001	0.057- 0.169	*0.1 0.016	1				*Growth*
**0.113 0.007	0.021 0.602	1					*GDP*
**0.245- 0.000	1						*Leverage*
1							*Cash holding*

* = Significant at the level 95% confidence interval, ** = significance at the level 99% confidence interval

Kolmogrov-Smirnov test is used to evaluate normality of dependent variable. The results of this test are shown in Table 2. As significance level is bigger than 0.05, dependent variable distribution is normal.

Table 2
Kolmogrov-Smirnov test

Significance level	Jacque bra	Variable
0.075	0.083	Profitability

Before data analysis, reliability of variables is investigated. To do this, some tests as Levin–Lin–Chu, Im pesaran, shin tests and Dickey-fuller tests are used. For this analysis, im pesaran and shin test is used. The result of this test is shown in Table 3. The GDP variable is excluded from the reliability computation due to limited number of observations and limited dispersion.

Table 3
Im, Pesaran and Shin test

Significance level	T statistics	Study variables
0.000	11.961–	Profitability
0.000	11.054–	Working capital
0.000	8.62–	Size
0.000	23.036–	Growth
0.000	9.798–	Leverage
0.000	15.027–	Cash holding

As shown in Table 3, significance level of study variables is less than 5% and all study variables are stationary. Then, we identify a good method for data analysis.

7.1. Study Hypothesis Test

7.1.1. First Model Test

To estimate coefficients of first model, to determine pooled data and homogeneity and non-homogeneity of them, chu and F-Limer statistics are used. The results of this test are shown in Table 4.

Table 4
The results of chu test

Chu test result	Significance level	F statistics	H0
H0 is rejected	0.000	7.731	Using pooled data model

As shown in Table 4, the result of chu test shows that *f* statistics is less than 5%. To test this model, the data are used as panel. In Table 5, by Hausman test, the significance of using fixed or random effects can be investigated.

Table 5
The results of Hausman test

Test result	Significance level	Chi-square statistics	H0
H0 is not rejected	0.107	10.445	Using random effects

As shown in Table 5, significance level of Huasman test is higher than 0.05. To estimate the coefficients of mentioned model, random effects model is used. The result of test by random effects and estimated generalized least squares (EGLS) is shown in Table 6.

Table 6
The results of first model test

Significance level	T statistics	Standard error	Coefficients	Variable
0.008	2.645	0.075	0.199	Constant
0.028	2.201	0.021	0.047	Working capital
0.067	1.831	0.014	0.025	Squared working capital
0.009	2.607	0.004	0.012	Size
0.000	6.989	0.01	0.074	Growth
0.078	1.76	0.017	0.03	GDP
0.000	10.201–	0.039	0.407–	Leverage
0.383	Coefficient of determination	58.156		F statistics
0.376	Coefficient of determination	0.000		Significance level of F statistics
1.606	Durbin-Watson		EGLS method (eliminating the probable effects of variance Heteroscedasticity)	

As shown in Table 6, *t*-statistics of working capital is bigger than +1.9965 and its significance level is smaller than 0.05 and there is a direct and significant relationship between working capital and profitability of companies listed on TSE.

As *t*-statistics of squared working capital is less than ±1.965, its significance level is bigger than 0.05 and there is no non–linear relationship between working capital and profitability of companies listed on TSE. Thus, the main first hypothesis of present study and its sub-hypotheses are not supported.

7.1.2. Second Model Test

To estimate the coefficients of second model, to determine pooled data and homogeneity or non-homogeneity, chu and F limer statistics are used. The results of this test are shown in Table 4-8.

Table 7
The results of chu test

Chu test result	Significance level	F statistics	H0
H0 is rejected	0.000	7.342	Using pooled data model

As shown in Table 7, the result of chu test shows that f statistics is less than 5%. To test this model, the data are used as panel. In Table 8, by Hausman test, the significance of using fixed or random effects can be investigated.

Table 8
The results of Hausman test

Test result	Significance level	Chi-square statistics	H0
H0 is not rejected	0.255	7.764	Using random effects model

As shown in Table 8, significance level of Huasman test is higher than 0.05. To estimate the coefficients of mentioned model, random effects model is used. The result of test by random effects and estimated generalized least squares (EGLS) is shown in Table 9.

Table 9
The results of second model test

Significance level	T statistics	Standard error	Coefficients	Variable
0.027	2.206–	0.006	0.013-	Constant
0.000	4.669	0.019	0.09	Working capital change
0.421	0.805	0.034	0.027	Squared working capital change
0.026	2.223	0.023	0.053	Size change
0.000	6.799	0.011	0.076	Growth change
0.607	0.514	0.019	0.009	GDP change
0.000	3.502–	0.05	0.175-	Leverage change
0.273	Coefficient of determination	28.108		F statistics
0.263	Adjusted Coefficient of determination	0.000		Significance level of F statistics
Durbin-Watson	Durbin-Watson	EGLS method (eliminating the probable effects of variance Heteroscedasticity)		

As shown in Table 9, *t*-statistics of working capital is bigger than +1.965 and its significance level is smaller than 0.05 and there is a direct and significant relationship between change of working capital and change profitability of companies listed on TSE.

As *t*-statistics of squared change of working capital is less than ±1.965, its significance level is bigger than 0.05 and there is no non –linear relationship between

change of working capital and profitability of companies listed on TSE. Thus, the main first hypothesis of present study and its sub-hypotheses are not supported.

7.1.3. Third Model Test

To estimate the coefficients of third model, to determine pooled data and homogeneity or non-homogeneity, chu and F limer statistics are used. The results of this test are shown in Table 10.

Table 10
The results of chu test

Chu test result	Significance level	F statistics	H0
H0 is rejected	0.000	7.637	Using pooled data model

As shown in Table 10, the result of chu test shows that the probability for F statistics is less than 5% and to test this model, the data are used as panel. In Table 11, by Hausman test, significance of using fixe or random effects is investigated.

Table 11
The results of Hausman test

Test result	Significance level	Chi-square statistics	H0
H0 is not rejected	0.196	12.312	Using random effects model

As shown in Table 11, significance level of Huasman test is higher than 0.05. To estimate the coefficients of mentioned model, random effects model is used. The result of test by random effects and estimated generalized least squares (EGLS) is shown in Table 12.

Table 12
The results of third model test

Significance level	T statistics	Standard error	Coefficients	Variable
0.016	2.414	0.075	0.182	Constant
0.000	3.38	0.027	0.038	Working capital
0.246	1.161	0.018	0.021	Squared working capital
0.008	2.663	0.004	0.012	Size
0.000	6.411	0.01	0.068	Growth
0.177	1.35	0.017	0.023	GDP
0.000	10.203–	0.039	0.405–	Leverage
0.001	3.118	0.099	0.31	Cash holding
0.000	4.065–	0.285	0.018–	Cash holding × working capital

Significance level	T statistics	Standard error	Coefficients	Variable
0.91	0.112	0.315	0.035	Cash holding × squared working capital
0.397	Coefficient of determination	40.863		F statistics
0.387	Adjusted Coefficient of determination	0.000		Significance level of F statistics
Durbin-Watson	Durbin-Watson	EGLS method (eliminating the probable effects of variance Heteroscedasticity)		

As shown in Table 12, *t*-statistics of working capital is bigger than +1.965 and its significance level is smaller than 0.05 and there is a direct and significant relationship between working capital and profitability of companies listed on TSE.

As *t*-statistics of squared working capital is less than ±1.965, its significance level is bigger than 0.05 and there is no non–linear relationship between working capital and profitability of companies listed on TSE. Thus, the main first hypothesis of present study and its sub-hypotheses are not supported.

7.1.4.   *Fourth Model Test*

To estimate the coefficients of fourth model, to determine pooled data and homogeneity or non-homogeneity, chu and F limer statistics are used. The results of this test are shown in Table 13.

Table 13
The results of chu test

Chu test result	Significance level	F statistics	H0
H0 is rejected	0.000	7.341	Using pooled data model

As shown in Table 13, the result of chu test shows that the probability for F statistics is less than 5% and to test this model, the data are used as panel. In Table 14, by Hausman test, significance of using fixe or random effects is investigated.

Table 14
The results of Hausman test

Test result	Significance level	Chi-square statistics	H0
H0 is not rejected	0.265	11.155	Using random effects model

As shown in Table 14, significance level of Huasman test is higher than 0.05. To estimate the coefficients of mentioned model, random effects model is used. The result of test by random effects and estimated generalized least squares (EGLS) is shown in Table 15.

Table 15
The results of fourth model test

Significance level	T statistics	Standard error	Coefficients	Variable
0.022	2.285–	0.006	0.014–	Constant
0.000	4.234	0.022	0.093	Change in Working capital
0.37	0.896	0.043	0.038	Squared working capital change
0.022	2.284	0.024	0.056	Change in Size
0.000	6.468	0.011	0.074	Change in Growth
0.66	0.439	0.019	0.008	Change in GDP
0.000	3.469–	0.049	0.172–	Change in Leverage
0.01	2.572	0.09	0.11	Change in Cash holding
0.000	3.78-	0.38	0.199–	Change in Cash holding × Change in working capital
0.373	0.891–	0.262	0.233–	Change in Cash holding × squared working capital change
0.276	Coefficient of determination	18.954		F statistics
0.262	Adjusted Coefficient of determination	0.000		Significance level of F statistics
Durbin-Watson	Durbin-Watson	EGLS method (eliminating the probable effects of variance Heteroscedasticity)		

As shown in Table 15, *t*-statistics of change in working capital is bigger than +1.965 and its significance level is smaller than 0.05 and there is a direct and significant relationship the change in working capital and profitability change of companies listed on TSE.

As *t*-statistics of squared change in working capital is less than ±1.965, its significance level is bigger than 0.05 and there is no non–linear relationship between change in working capital and change in profitability of companies listed on TSE. Thus, the main first hypothesis of present study and its sub-hypotheses are not supported.

8. CONCLUSION

Regarding the first main hypothesis test "There is a non-linear relationship between working capital and profitability of company and its sub-hypotheses as "If working capital of company is smaller than average, there is a direct relationship between working capital and profitability of company and if "working capital of company is bigger than average, there is an inverse relationship between working capital and profitability of company". Two models of regression are used. The results showed

that there was a direct and significant relationship between working capital and profitability of companies listed on Stock exchange market. In second model, two independent variables "change in working capital" and "change of squared working capital", four control variables (change in size), change in growth of company, change in growth of GDP and change in leverage, random effects model and EGLS are used. The results showed that there was a direct and significant relationship between the change in working capital and change in profitability of companies listed on TSE.

Regarding the second main hypothesis test "cash holding is effective on the relationship between working capital and profitability of company" and its sub-hypotheses as "If working capital of company is smaller than average, there is a direct relationship between working capital and profitability of company based on cash holding and there is a significant difference and if "working capital of company is bigger than average, there is an inverse and significant relationship between working capital and profitability of company based on cash holding". Two models of regression are used. The results showed that cash holding weakened the direct association between working capital and profitability of companies listed on TSE. In the second model, the results showed that the change in cash holding weakened the direct relationship between change in working capital and change in profitability of companies listed on TSE. In the second model, the results showed that the change in cash holding weakened the direct relationship between change in working capital and change in profitability of companies listed on TSE. Regarding the explanation of the direct effect of working capital on profitability of companies, it is required that the working capital allows the companies to develop with sale and profitability increase. For example, the increase of goods inventory can reduce supply cost and can create a shield against input price volatilities and sale loss is reduced due to potential demand volatilities (e.g. Blinder and Maccini, 1991; Fazzari and Petersen, 1993; Corsten and Gruen 2004). According to the results of first hypothesis test as working capital has ascending effect on profitability of companies, it is proposed to the investors in companies listed on TSE to consider this issue for optimal investment. Based on the considerable effect of profitability on capital market, the company condition is considered in terms of working capital and it is proposed to the managers of companies listed on TSE to increase profitability to increase working capital of company. According to the results of second hypothesis as cash holding weakens the direct relationship between working capital and profitability of companies, it is proposed to investors in companies listed on TSE to consider this effect for optimal investment. Based on the considerable effect of profitability on capital market, the company condition is considered seriously in terms of working capital and cash holding. It is proposed to the managers of companies listed on TSE to consider that increase of cash flow holding causes that positive effect of working capital on profitability is weakened.

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