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A Comparison of Working Capital Management of Chemical and Medicine Listed Companies in Tehran Stock Exchange

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Abstract

The main objective of the current study is comparing working capital management of two groups of listed companies in Tehran Stock Exchange. The results show that, in medicine industry compared to chemical industry, debt ratio makes more impact on reduction of net liquidity. But examination of impact of LEV over WCR indicate that, in chemical industry, debt ratio makes more impact on reduction of working capital requirements, compared to medicine industry.

Keywords: Working Capital, Current assets, Tehran Stock Exchange, Iran

1. Introduction

There is a great emphasis on the importance of working capital management in recent years and a great part of the decisions of financial managers relate to that. That's because management of working capital influences the firm's profits and thus its market value. In order to realize a proper management of working capital, the managers should create a balance between risk and return. Based on the theory of Risk and Return, the more a firm holds net working capital, the less risk faces the firm, and instead the firm's returns will also decrease. The opposite is also true. Companies that hold less liquidity face a great risk. Therefore creating a correspondence between risk and capital return bears a great significance. The company's ability in handling its operations over a long period depends on how the company manages its working capital. Therefore the manager's capability in making a balance between the company's risk and return plays a major role in persistence or failure of company's activities.

1.1 The evolving issue

The main objective of a firm is to increase the market value (Smith, 1980). Efficient management of working capital is a fundamental part of the overall corporate strategy in creating the shareholders' value. Firms try to keep an optimal level of working capital that maximizes their value (Howorth & Westhead, 2003; Deloof, 2003; Afza & Nazir, 2007).

Working capital means the whole current assets owned by a firm. Net working capital is the sum when short term liabilities are extracted from current assets. Return of total assets of a firm as a result of an activity is closely related to level and distribution of assets of the firm and efficiency in application of these assets (Mehmet Sen & Eda Oruc, 2009).

There's been a great emphasis on the importance of working capital management in recent years. Capital management is a great part of the decisions of financial managers relate to that. In order to attain a desirable working capital management, the manager should control the tradeoff between profitability and liquidity accuracy (Zariyawati et al., 2009). Dilemma

in working capital management is to achieve a balance between liquidity and profitability of a firm (Smith, 1980; Raheman & Nasr, 2007). In literature, there is a long debate on the risk/return tradeoff among different working capital policies (Pinches, 1992; Brigham & Ehrhardt, 2004; Gitman, 2005; Moyer et al., 2005). More aggressive working capital policies are associated with higher return and risk, while conservative working capital policies are associated with lower risk and return (Weinraub and Visscher, 1998; Gardner et al., 1986). Also, Working capital management is important because of its effects on the firms' profitability and risk, and consequently its value (Smith, 1980). The greater the investment in current assets, the lower the risk, but also the lower the profitability obtained. Referring to theory of risk and return, investment with more risk will result to more return. Therefore, firms with high liquidity of working capital may have low risk then low profitability. Conversely, firm that has low liquidity of working capital, facing high risk results to high profitability. The issue here is in managing working capital, firm must take into consideration all the items in both accounts and try to balance the risk and return (Zariyawati et al., 2009).

Evidence suggests that relatively few small firms utilize basic working capital management routines and they show a greater prevalence of ad hoc or subjective working capital decision-making (Nayak & Greenfield, 1994; Khoury et al., 1999). That is in spite of the fact that smaller firms must use working capital management in order to reduce the odds for their business termination and also for improving the business performance. The firm's ability in continuing the operations over a long period depends on how it treats the working capital.

Explanations about why working capital management is significant for a firm generally focus on the relationship between efficiency in working capital management and firm profitability. Efficient working capital management includes planning and controlling of current liabilities and assets in a way it avoids excessive investments in current assets and prevents from working with few current assets insufficient to fulfill the responsibilities. In relevant studies the measure taken as an indicator of efficiency in working capital management is usually cash conversion cycle. Cash conversion cycle for a firm is the period during which it is transited from money to good and again to money and this cycle can be demonstrated (Mehmet Sen & Eda Oruc, 2009). Therefore evidently working capital management comprises an important part of firm's financial management, and if the management is not carried out properly, a possible over-investment can reduce firm's profitability, and under-investment can lead to losing sale opportunities or a default on debt payment deadline.

The crucial part in managing working capital is required maintaining its liquidity in day-to-day operation to ensure its smooth running and meets its obligation (Eljelly, 2004). Yet, this is not simple task since managers must take sure that business operation is running in efficient and profitable manner. There are the possibilities of mismatch of current asset and current liability during this process. If this happens and firm's manager cannot manage it properly then it will affect firm's growth and profitability. This will further lead to financial distress and finally firms can go bankrupt (Zariyawati et al., 2009).

In predicting the financial crisis of a company, Shulman and Cox (1985) classify net working capital into Working Capital Requirements (WCR) and Net Liquid Balance (NLB) to evaluate the management of working capital and capability of raising and allocating capital, respectively. Net liquid balance represents the surplus of the total of cash, cash equivalents and short term investment which remains after deducting the total of trade payments, short-term and long-term debts. Working capital requirement means the current assets with current debts subtracted. In other words, working capital requirements are the total of receivable accounts and inventory after payable accounts and other payables are deducted. Their study found NLB is better than traditional indicators in terms of predicting financial crises and the liquidity of a company. This research was done similar to that of Shulman and Cox (1985).

Hawawini, Viallet and Vora (1986) hold that evaluation based on NLB and WCR were better than any based on traditional indicators. According to the pecking order theory, a company short of funds will tend to raise capital inside before issuing new stocks or borrowing money from outside (Myers, 1984). To raise capital via new securities will bring more outside monitoring and limitations besides incurring issuing costs. Hence a firm will keep its own capital, if any, for internal use and/or to pay debts. More debt means less internal capital available for operations, and the expected debt ratio is negatively related to NLB, indicating a capacity to raise money. As to linkage between debt ratio and WCR, a higher debt ratio is due to less capital for daily operations. Under such circumstances, the firm may have to raise capital from outside in response to lack of funding, plus exercise caution in working capital management so as not to aggravate the shortage of funds. Working capital will be used most efficiently at this time. With a higher debt ratio higher, efficient working capital management will avoid increasing capital requirements that trigger external borrowing. Expected debt ratio is negatively related to working capital management (Chiou et al, 2006)

Previous studies demonstrate that more growth opportunities and more fluctuations of future cash flow will increase the cash hold and short-term investment of a company (Kim, Mauer, and Sherman, 1998; Opler et al., 1999; Wu, 2001). Thus expected growth opportunity and operating cash flows positively correlate with NLB. Greater cash flow spawned by operating activity implies better working capital management. Terms to pay operation-related liabilities are lengthened and operation-related receivables can be accelerated in collection, causing less demand on working capital. Expected operating cash flow is negatively related to WCR, and firms with a high growth rate pay more attention to management of capital. Operation-related working capital and liabilities are then kept at relatively low levels, causing comparatively low demand on WCR. Expected WCR is thus negatively related to the growth rate (Chiou et al, 2006).

In our country, two major industries who have the most participation in exchange market are chemical and medicine industries. The question is that which of these industries have a better working capital management. In what follows, we will discuss the research

background and then the research method. In the next stage there will be a conclusion along with suggestions for future researches.

2. Literature Review

A great deal of researches has been done about the factors influencing working capital management. Many studies have examined financial relations as a part of working capital management. Researches done about working capital management show that business indicators have an impact on firm's financial relations (Horrigan, 1965; Lou, 1984; Liu, 1985; Zhou, 1995; Su, 2001). Gupta (1969) and Gupta and Huefner (1972) examined the differences in financial ratio averages among industries. The conclusion of both the studies was that differences do exist in mean profitability, activity, leverage and liquidity ratios among industry groups.

Filbeck and Krueger (2005) highlighted the importance of efficient working capital management by analyzing the working capital management policies of 32 non-financial industries in the US. According to their findings, significant differences exist among industries in working capital practices overtime. Moreover, these working capital practices, themselves, change significantly within industries overtime. Similar studies have been done by Soenen (1993), Maxwell et al., (1998), Long et al., (1993) and also Gombola and Ketz (1983).

Carpenter and Johnson (1983) provided empirical evidence that there is no linear relationship between the level of current assets and revenue systematic risk of the US firms; however, some indications of a possible nonlinear relationship were found, which were not highly statistically significant.

Shulman and Cox (1985) categorize net working capital management into working capital requirements and net liquidity balance which are respectively for working capital evaluation and the ability to increase and allocate capital. Their studies showed that net liquidity works better than the traditional measure in conditions of predicting financial and liquidity crises.

Suk et al., (1992) explain that there is a noticeable difference between Japanese and American firms in working capital management. Soenen (1993) investigates the relationship between the net trade cycle as a measure of working capital and return on investment in the US firms. The results of chi-square test indicated a negative relationship between the length of net trade cycle and return on assets. Furthermore, this inverse relationship was found different across industries depending on the type of industry. A significant relationship for about half of the industries studied indicated that results might vary from industry to industry. In order to validate the results of Soenen (1993) on a large sample and with a longer time period, Jose et al. (1996) examined the relationship between aggressive working capital management and profitability of the US firms using Cash Conversion Cycle (CCC) as a measure of working capital management, where a shorter CCC represents the aggressiveness of working capital management. The results indicated a significant negative

relationship between the CCC and profitability, indicating that more aggressive working capital management is associated with higher profitability.

Smith and Begemann (1997) examine the relation between liquidity and profitability of South-African firms. Their results also proved that the firms' size has an impact on the amount of working capital management. Weinraub and Visscher (1998) discuss the issue of aggressive and conservative working capital management policies by using quarterly data for the period 1984-93 of the US firms. Their study considered 10 diverse industry groups to examine the relative relationship between their aggressive/conservative working capital policies. Their study concluded that the industries had distinctive and significantly different working capital management policies. Moreover, the relative nature of the working capital management policies exhibited remarkable stability over the 10-year study period. The study also showed a high and significant negative correlation between industry asset and liability policies and found that when relatively aggressive working capital asset policies are followed, they are balanced by relatively conservative working capital financial policies.

Shin and Soenen (1998) concluded that reducing the level of current assets to a reasonable extent increases a firm's profitability. Similarly, Deloof (2003) analyzed a sample of large Belgian firms for the period 1992-1996 and the results confirmed that Belgian firms can improve their profitability by reducing the number of days accounts receivable are outstanding and reducing inventories.

Lyrودي and Lazaridis (2000) use food industry Greek to examined the cash conversion cycle (CCC) as a liquidity indicator of the firms and tries to determine its relationship with the current and the quick ratios, with its component variables, and investigates the implications of the CCC in terms of profitability and firm size. The results of their study indicate that there is a significant positive relationship between the cash conversion cycle and the traditional liquidity measures of current and quick ratios. The cash conversion cycle also positively related to the return on assets and the net profit margin but had no linear relationship with the leverage ratios. Conversely, the current and quick ratios had negative relationship with the debt to equity ratio, and a positive one with the times interest earned ratio. Finally, there is no difference between the liquidity ratios of large and small firms.

Teruel and Solano (2005) suggested that managers can create value by reducing their firms' number of days' accounts receivable and inventories. Similarly, shortening the CCC also improves the firms' profitability.

Chiou et al., (2006) in studying the working capital management of Taiwan firms found that the relation between debt and cash conversion cycle has an impact on working capital management but the type of industry and the size of the firm have no impact on working capital management.

Zariyawati et al., (2009) carried out a research about the impact of working capital management on firms' profit abilities in Malaysia. The results show that cash conversion cycle has a negative relation with firm's profitability.

Chatterjee (2010) examined the impact of working capital management and profitability in firms accepted in London Exchange Market during the period 2006 to 2008. He used

Pearson's correlation coefficient for evaluating the impact of cash conversion cycle, receivable accounts settlement period, inventory turnover and day's accounts payables, current and immediate proportion to the gross operating profit ratio. The results indicate that there is a meaningful negative relation between working capital management and profitability. This research suggests that increase in cash conversion cycle results in a decrease in profits. There's also a negative meaningful relation between liquidity and profitability.

Karaduman et al., (2011) examined the relationship between efficiency of working capital management and corporate profitability of selected companies in the Istanbul Stock Exchange for the period of 2005-2009. The panel data methods are employed in order to analyze the mentioned relationship. The Cash Conversion Cycle (CCC) is used as a measure of working capital management efficiency, and return on assets (ROA) used as a measure of profitability. The findings show that reducing CCC positively affects ROA.

Rajesh and Reddy (2011) studied the relationship between working capital management and companies' profitability. The research findings show that the components of working capital affect on corporate performance.

Mojtahedzadeh et al., (2011) examined the relationship between working capital management and corporate profitability. The statistical population includes the listed companies on Tehran Stock Exchange (TSE) and a sample of 101 firms during the period of 2004-2008. Multivariate regression and Pearson correlation are used to test hypotheses. Findings show a negative significant relationship exists between cash conversion cycle, Number of Days of A/P, Number of Days of A/R and corporate profitability. Although, the relationship between the average period of Inventory retention and profitability was not significant, but confirmation of the three other subsidiary hypotheses which are independent of each other showed the existence of a significant relationship between corporate profitability and working capital management.

Alipour (2011) examined the relationship between working capital management and profitability. Cash conversion cycle is one of the important measuring tools to calculate the efficiency of working capital management. The time realm of the research was 2001-2006 and the studied companies have been the ones accepted in Tehran stock exchange. In general, out of 2628 companies; the company has been selected as a top company for 1063. Then multiple regression and Pearson's correlation was used to test the hypothesis. The results of the statistical test of the hypothesis indicate that there is a negative significant relation between number of days accounts receivable and profitability, a negative significant relation between Inventory turnover in days and profitability, a direct significant relation between number of day's accounts payables and profitability and there is a negative significant relation between cash conversion cycle and profitability. The results of the research show that in the studied companies, there is a significant relation between working capital management and profitability and working capital management has a great effect on the profitability of the

companies and the managers can create value for shareholders by means of decreasing receivable accounts and inventory.

Mousavi and Jari (2012) evaluated relationship between working capital management and corporate performance. They used factors such as return on total assets, return on owner's equity and market value to book value ratio for evaluating corporate performance and net liquidity balance as criterion for evaluating of working capital management. For testing the research hypotheses, financial statements' data of 56 companies accepted in Tehran Stock Exchange has been used and for analyzing and testing hypotheses, one regression model and correlation method is used. Research results show that there are positive relationship between working capital management (NLB) and corporate performance.

Farzinfar and Ghadirian (2012) assessed the impacts of working capital management on the profitability of pharmaceutical companies of the stock exchange of Tehran for the period of 2005 –2009. Gross operating profit ratio was set as the profitability index and cash conversion cycle, accounts receivable period, inventory period and accounts payable period as the working capital management indices. It has not been possible to perform an annual analysis; therefore, the whole data of the period of five years have been studied. On the other hand, as it was not possible and justifiable to merge the data of five years due to the difference in the annual value of data, therefore the values were modified based on inflation index. Variables were tested using Pearson correlation coefficient and multivariate linear regression. The results show that there is significant negative relation between payables and receivables conversion periods and gross operating profit. Moreover, there is a significant positive relation between inventory conversion period and the ration of gross operating profit

3. Research Methodology

3.1 Statistical society

The Statistical society of this research is comprised of chemical industry and medicine industry that are listed in TSE. In chemical industry, 34 companies, and in material and medicine industries, 30 companies were selected and information related to these companies is gathered over 10 years (2001-2010).

3.2 Research Hypotheses

Based on previous studies, and with respect to the research subject, hypotheses below have been composed which will be tested in chemical and medicine industry:

- 1) Debt ratio is negatively related to working capital management.
 - a. Debt ratio is negatively related to NLB.
 - b. Debt ratio is negatively related to WCR.
- 2) Operating cash flow is related to working capital management.
 - a. Operating cash flow is positively related to NLB.
 - b. Operating cash flow is negatively related to WCR.
- 3) Growth rate of a company is related to working capital management.
 - a. Growth rate of a company is positively related to NLB.
 - b. Growth rate of a company is negatively related to WCR.

3.3 Research Model

In this research, in order to evaluate the performance of working capital management in two medicine and chemical industries, net liquidity balance and working capital requirements were used as a working capital management proxy, and debt ratio, operational cash flow and growth rate of companies listed in Tehran Stock Exchange were used as independent variables. In order to estimate the model and examine the proposed hypotheses, simple linear regression or ordinary least squares methods have been used. Thus the regression equation is proposed as follows:

(1)

$$\Delta WCR_TA = B_0 + B_1 \Delta LEV + B_2 \Delta OCF_TA + B_3 \Delta GROWTH + B_4 AGE + B_5 \Delta ROA + B_6 \Delta LNNTA + \varepsilon$$

$$\Delta NLB_TA = B_0 + B_1 \Delta LEV + B_2 \Delta OCF_TA + B_3 \Delta GROWTH + B_4 AGE + B_5 \Delta ROA + B_6 \Delta LNNTA + \varepsilon$$

(2)

ΔNLB_TA is the change in NLB_TA . $NLB = (\text{cash and cash equivalents} + \text{short-term investments}) - (\text{short-term debt} + \text{commercial note payable} + \text{long-term debt a year term})$. These considerations of company financial decisions are irrelevant to the operation cycle. Thus, it is called net liquid balance (NLB). To reduce the influence of firm size, NLB is deflated by total assets. Later we use NLB_TA to measure a firm's net liquid balance.

ΔWCR_TA is the change in WCR. $WCR = \text{working liquid assets} - \text{working liquid liabilities}$. WCR equals net working capital minus NLB. $WCR = (\text{accounts receivables} + \text{inventories}) - (\text{accounts payable} + \text{other payables})$. These accounts are related to the operation cycle and thus called working capital requirements (WCR). To reduce the influence of firm size, WCR is deflated by total assets. Later we use WCR_TA to measure a firm's working capital requirements.

ΔLEV is the change in the debt ratio. $\text{Debt ratio} = \text{total liabilities} / \text{total assets}$. Change in the debt ratio is calculated with the first order seasonal difference of debt ratio.

$\Delta GROWTH$ is change in the sales growth. Growth is deflated by total assets.

ΔOCF_TA is the change in the operating cash flow, deflated by total assets.

AGE is the firm age, from establishment of the company up to the year of sample data. To use the age of a firm as a representative variable, growth of a company is represented: at the early stage of a business, it has a higher growth rate that slows over time.

ΔROA is the change in the return on assets (ROA).

$\Delta LNNTA$ is the change in the firm size. A natural logarithm of total company assets is used as a proxy of firm size, and the first order difference is calculated.

It must be noted that in this research SPSS software is used for analysis of the results.

3.4 Results analysis

First in Table 1, descriptive statistics related to the model variables for two chemical and medicine industries have been proposed for the study period. As can be seen, the average amounts of $\Delta LNNTA$ for these industries have been marked with negative sign. ΔWCR

average also shows a positive sign for the aforementioned industries. This indicator has turned negative in years, 2001, 2002, 2004, 2006 and 2008.

Table 1. Descriptive statistics related to model variables

	Δ LNB_TA	Δ WCR_TA	Δ LEV	Δ OCF_TA	Δ GROWTH	AGE	Δ ROA	Δ LNTA	N
Total sample									
Mean	-57691.03	12307.77	0.002	20930.94	60342.9	9.09	-0.01	0.20	60
S.D	526099.5	190836.0	0.13	185016.4	476163.5	6.42	0.44	0.39	60
Means by year									
2001	-27379.8	-632.77	-0.02	22904.92	42845.13	4.86	0.02	0.21	60
2002	7830.483	-3900.05	-0.01	12786.04	10846.10	5.86	-0.02	0.14	59
2003	-75339.8	10915.35	0.05	14241.96	103640.51	6.82	-0.03	0.27	57
2004	-94473.2	-5260.13	0.01	2428.30	101250.71	7.93	-0.004	0.29	58
2005	-49016.5	21863.75	0.031	24129.57	62887.89	8.47	0.07	0.24	57
2006	-137639	-275.97	0.02	55335.88	112092.31	9.79	-0.09	0.25	61
2007	-97674.6	71195.83	-0.05	8386.59	208965.76	10.75	-0.01	0.21	63
2008	-193086	-352.76	-0.02	32273.78	-97984.18	11.48	0.14	0.23	53
2009	144284.6	5095.93	-0.04	57260.68	-3102.35	12.24	-0.12	-0.03	56
2010	-5339.6	43286.4	0.01	-24262.75	-6749.5	13.17	-0.02	0.12	55

Here the research hypotheses are separately examined for the industries.

3.5 Medicine industry

Results derived from two regression models related to medical industry are presented in Table 2. Two fitted models for this industry include:

$$1) \Delta NLBR_{TA} = 146425.37 - 0.07 * \Delta GROWTH + 58286.2 * \Delta ROA - 0.03 * \Delta OCF - 777994.85 * \Delta LNTA - 1356136.6 * \Delta LEV - 3346.930 * AGE \quad (\text{Model 1})$$

$$2) \Delta WCR_{TA} = -29514.3 - 0.038 * \Delta GROWTH + 13589.5 * \Delta ROA - 0.09 * \Delta OCF + 130200.1 * \Delta LNTA - 407326.6 * \Delta LEV + 1172.8 * AGE \quad (\text{Model 2})$$

As can be seen in Table 2 R Square (R^2) in two estimated model equal to 0.729 and 0.475 which is telling of the high explanatory power of these models. In other words in the first model %72.9 and in the second one %47.5 of changes in the dependent variable (Δ NLBR_{TA} and Δ WCR_{TA}) are described by independent variables.

Examination of statistic F in both estimated models in this industry indicates general meaningfulness of regressions. The probability related to the Kolmogorov-Smirnov test in models 1 and 2 are respectively 0.39 and 0.19. Therefore with 95% certainty normality of remainder approved. Statistic D-W Durbin- Watson in both models is close to number 2 which is telling of the fact that there's no meaningful correlation between regression model components. Values of statistic VIF are also smaller than 5. Therefore the problem of colinearity is also witnessed. Finally with respect to the confirmation of above hypotheses we can be assure of results derived from the fitted model. Now with regards to Table 2 we examine the above hypotheses:

Table 2. Regression Model Estimate for Medicine Industry

Variable		Δ NLB_TA	Prob		Δ WCR_TA	Prob
(Constant)	+	146425.37	0.00***	-	29514.3	0.00***

DGROWTH	-	0.07	0.08*	-	0.038	0.00***
DROA	+	58286.2	0.14 ^{ns}	+	13589.5	0.14 ^{ns}
DOCF	-	0.03	0.90 ^{ns}	-	0.09	0.09*
DLNTA	-	777994.85	0.00***	+	130200.1	0.00***
DLEV	-	1356136.6	0.00***	-	407326.6	0.00***
AGE	-	3346.9	0.27 ^{ns}	+	1172.8	0.09*
N		264			264	
R		0.854			0.689	
R^2		0.729			0.475	
Adj. R^2		0.722			0.46	
F		118.119			39.75	
Pr>F		0.000			0.000	
Durbin-Watson		1.96			2.20	

***, **, * significant at 0.01, 0.05, and 0.1 levels, respectively

●First hypothesis: Debt ratio is negatively related to working capital management.

Based on regression estimates, the probability of statistical zero based on lack of relation between LEV and NLB has been close to zero then the hypothesis is refuted. So we can accept the idea of a relation between debt ratio (LEV) and NLB. Since LEV coefficient in the first model is negative, it can be said that debt ratio (LEV) has a negative relation with net liquidity balance. Therefore the hypothesis 1-1 is confirmed. In the same manner, the existence of a relation LEV and WCR is also confirmed on % 95 certainty levels. Since LEV coefficient in the second model is also negative, it can be said that debt ratio (LEV) has a negative relation with working capital requirements. Therefore hypothesis 1-2 is also confirmed. Thereby with the hypotheses 1-1 and 1-2 confirmed, the first research hypothesis that suggests a negative relation between debt ratio and working capital management in medicine industry is confirmed. In other words in medicine industry debt ratio (LEV) has a negative relation with working capital management.

●Second hypothesis: Operating cash flow is related to working capital management.

In this industry no meaningful relation can be seen between operational cash flow and net liquidity balance. That's because due to Table 2, the probability is statistical supposition 0.9. Thus the zero statistical supposition indicating non-existence of such relation can't be rejected. Thereby, hypothesis 2-1 suggesting the existence of such relation is confirmed. Also, in this industry there is no meaningful negative relation between variables OCF and WCR, because probability is statistical supposition 0.09. Thus hypothesis 2-2 is rejected. In general with regards to refutation of the first and second parts of the second hypothesis, the second hypothesis can't be approved for this industry. In other words, in medicine industry, there's no relation between operational cash flow and working capital management.

●Third Hypothesis: Growth rate of a company is related to working capital management.

Examination of regression results reveals that probability of zero statistical supposition related to the non-existence of relation between growth and NLB is 0.08 which is confirmed. Therefore there's no meaningful relation between growth and NLB. Thus hypothesis 3-1 suggesting a positive relation is not confirmed. Also, examination of relation between

growth and WCR also reveals that zero statistical supposition is close to zero and is rejected at % 95 certainty levels. Thus it can be said that there is a meaningful relation between growth and WCR. With growth coefficient being negative in the second model, this relation is negative. Thereby hypothesis 3-2 is confirmed. In other words, in medicine industry, company's growth rate has a negative relation with working capital management. With the first part rejected, the third hypothesis is entirely rejected.

3.6 Chemical Industry

Results derived from two regression model estimates related to the chemical industry are presented in Table 3. Two fitted models for this industry are as follow:

$$1) \Delta NLBR_{TA} = 145062.47 * \Delta ROA - 157075.51 * \Delta LNNTA - 1239453.34 * \Delta LEV - 0.51 * \Delta GROWTH - 4538.58 * AGE - 0.16 * \Delta OCF + 60892.76 \quad (\text{Model 3})$$

$$2) \Delta WCR_{TA} = 40229.76 * \Delta ROA + 62361.1 * \Delta LNNTA - 803389.0675 * \Delta LEV - 0.16 * \Delta GROWTH - 2269.21 * AGE + 0.17 * \Delta OCF + 45242.05 \quad (\text{Model 4})$$

As can be seen in Table 3, R Square (R^2) in two estimated models is 0.295 and 0.201. This shows that in the first model, %29.5, and in the second model %20.1 of changes in dependent variable ($\Delta NLBR_{TA}$ and ΔWCR_{TA}) are described by independent variables. Examination of statistic F in both estimated models in this industry indicates general meaningfulness of regressions. Because the probability related to statistic Fisher for testing zero supposition of incorrectness of model is zero. Therefore zero supposition is rejected and in turn the correctness of both models is confirmed. Then classic hypotheses in both models were examined and confirmed, because no trend was noticed in the standardized residues distribution chart against standardized predictions, and the symmetry of observations are around zero line. Therefore homogeneity in variance of residues is confirmed. The probability of Kolmogorov-Smirnov in models 1 and 2 are respectively 0.06 and 0.18. Statistic D-W Durbin- Watson in both models is close to 2, which is telling of the fact that there's no meaningful correlation between regression model components. Values of statistic VIF are also smaller than 5. Therefore no problem of co-linearity is witnessed. Finally with respect to the confirmation of above hypotheses we can be sure about results derived from the fitted model. Now with regards to Table 3 we examine the above hypotheses:

- First hypothesis: Debt ratio is negatively related to working capital management.

Based on regression estimates, the probability of statistical zero based on lack of relation between LEV and NLB has been close to zero, so we can accept the idea of a relation between debt ratio (LEV) and NLB. Since LEV coefficient in the third model is negative, the hypothesis 1-1 is confirmed. In other words, in chemical industry, debt ratio (LEV) has a negative relation with NLB. In the same manner, the existence of a relation LEV and WCR is also confirmed. Since LEV coefficient in the fourth model is also negative, this relation is also negative and hypothesis 1-2 is also confirmed. Therefore we can say that, in chemical industry, LEV has a negative relation with working capital management. Thereby with the hypotheses 1-1 and 1-2 confirmed, the first research hypothesis that suggests a negative

relation between debt ratio and working capital management in chemical industry is confirmed.

●Second hypothesis: Operating cash flow is related to working capital management.

In this industry no meaningful relation can be seen between operational cash flow and net liquidity balance. Because according to Table 3, the probability of statistical zero supposition is 0.17. Thus the zero statistical supposition indicating non-existence of such relation can't be rejected. In other words, in chemical industry, there's no relation between operational cash flow and net liquidity balance. But there's a meaningful relation between OCF and WCR in this industry, because the probability of statistical supposition is 0.01.

Thereby, hypothesis 2-1 suggesting the existence of such relation is confirmed. Also, in this industry there is no meaningful negative relation between variables OCF and WCR, because probability is statistical supposition 0.09. Thus hypothesis 2-2 is rejected at % 95 certainty levels. In general with regards to refutation of the first and second parts of the second hypothesis, the second hypothesis can't be approved for this industry. In other words, in medicine industry, there's no relation between operational cash flow and working capital management. But with respect to positive value of OCF coefficient in model 4, hypothesis 2-2 is refuted. Therefore it can be said that, in this industry, there's a positive relation between operational cash flow and working capital requirements. The second hypothesis is entirely disproved for this industry.

●Third Hypothesis: Growth rate of a company is related to working capital management.

Examination of regression results reveals that probability of zero statistical supposition related to the non-existence of relation between growth and NLB is rejected. Therefore there's a meaningful relation between growth and NLB. In other words, there's a negative meaningful relation between company's growth and net liquidity balance. Also, examination of relation between growth and WCR also reveals that zero statistical supposition is close to zero and is rejected. Thus it can be said that there is a meaningful relation between growth and WCR. With growth coefficient being negative in model 4, this relation is negative. In other words, in this industry, company's growth rate has a negative relation with working capital management. Thereby hypothesis 3-2 is confirmed. Ultimately, with the first part refuted, the third hypothesis is entirely rejected.

Table 3. Regression Model Estimate for Chemical Industry

Variable		Δ NLB_TA	Prob		Δ WCR_TA	Prob
(Constant)	+	60892.8	0.18 ^{ns}	+	45242.06	0.08*
DGROWTH	-	0.514	0.00***	-	0.16	0.002***
DROA	+	145062.5	0.06*	+	40229.8	0.35 ^{ns}
DOCF	-	0.166	0.17 ^{ns}	+	0.17	0.01**
DLNTA	-	157075.5	0.07*	+	62361.1	0.21 ^{ns}
DLEV	-	1239453.3	0.00***	-	803389.1	0.00***
AGE	-	4538.589	0.23 ^{ns}	-	2269.2	0.285 ^{ns}
N		258			258	
R		0.543			0.449	

R^2	0.295	0.201
Adj. R^2	0.279	0.18
F	18.01	10.84
Pr>F	0.000	0.000
Durbin-Watson	1.85	1.70

***, **, * significant at 0.01, 0.5, and 0.1 levels, respectively

The hypotheses of this research are summarized in Table 4:

Table 4. Comparison of Hypotheses in Both Chemical and Medicine Industries

Hypotheses	Medicine Industry	Chemical Industry
1	Confirmed	Confirmed
1-1	Confirmed	Confirmed
1-2	Confirmed	Confirmed
2	Rejected	Rejected
2-1	Rejected	Rejected
2-2	Rejected	Rejected
3	Rejected	Rejected
3-1	Rejected	Rejected
3-2	Confirmed	Confirmed

Comparison of results from estimated regression models show that in chemical industry LEV influences NLB with coefficient 1239453.3, and in medicine industry with 1356136.6. Thus, with negative value of coefficient s it can be said that in medicine industry with each increment in LEV, NLB is reduced with a greater amount. But examination of the amount of LEV impact on WCR shows that in medicine industry each one-unit change in LEV reduces WCR as much as 407326.6, while each one-unit change in LEV in chemical industry, reduces SCR as much as 803389.1.

Moreover, there's no relation between OCF and WCR in medicine industry while each one-unit change in chemical industry, increase WCR as much as 0.17 units. There's no meaningful relation between OCF and NLB in either industries. Also, in chemical industry growth influences NLB with a 0.514 coefficient while in medicine industry there's no relation between growth and NLB. Therefore, in chemical industry with each increment in growth, NLB reduces. But examination of the impact of growth over WCR shows that, in medicine industry, each one-unit change in growth reduces growth as much as 0.038 units, while each one-unit change in growth in chemical industry, increases WCR as much as 0.16 units. Thereby, in chemical industry, with each one unit change in growth, WCR decreases with a greater amount.

4. Conclusion and Suggestions

Results taken from the current study show that, in medicine industry compared to chemical industry, debt ratio makes more impact on reduction of net liquidity. But examination of impact of LEV over WCR indicate that, in chemical industry, debt ratio makes more impact on reduction of working capital requirements, compared to medicine industry. Also, in medicine industry there is no relation between OCF and WCR while in chemical industry OCF has an increasing effect on working capital requirements. But since there's no meaningful relation between OCF and NLB in both industries, no comparison is possible. Additionally, the comparison of results show that in medicine industry there's no relation between growth and NLB and only in chemical industry, sales growth has an impact on net liquidity balance. But examination of the impact of growth on WCR shows that, in chemical industry, sales growth makes more impact on reduction of working capital requirements, compared to medicine industry. Since no research has been done drawing comparisons between working capital management chemical and medicine industries, therefore it's impossible to compare the results of this research with others.

Below are some suggestions with regards to current research:

- 1- Since in this research information from two chemical and medicine industries have been used, we suggest that working capital management be examined in other industries that have an important role in our country's economy.
- 2- Considering the impact of working capital management on company's profitability and in turn company's market value, the change in company's profitability due to improve in working capital can also be studied.

This research faced certain restrictions which are as follow:

- 1- Since information from only two chemical and industries were used, it's impossible to generalize the results of this research to other firms listed in Iranian Exchange Market.
- 2- The impact of inflation on working capital management has been ignored.
- 3- The impacts of other economic factors such as exchange rate changes or price fluctuation have not been considered.

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