

Review Article

**INVESTIGATING THE RELATIONSHIP BETWEEN WORKING CAPITAL MANAGEMENT STRATEGIES AND RISK MANAGEMENT FOR COMPANIES LISTED ON THE TEHRAN STOCK EXCHANGE**

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**Abstract**

The various working capital management strategies adopted by businesses influence their liquidity, risk, and return. This study investigates the relationship between working capital strategies and corporate risk management. The statistical population of this research consists of companies listed on the Tehran Stock Exchange in the 2006–2012 interval. One hundred forty companies were studied from nine industries over a seven-year period using a screening method. Corporate data were collected from stock market statistics. Financial statements, including balance sheets, income statements, and explanatory notes of financial statements at the end of each fiscal year (March 19), were used as research tools. Moreover, descriptive statistics and model parameters for statistical analysis and inference were calculated using suitable tests (including Hausman and Pooling), EXCEL spreadsheets, and the EViews package. The results revealed a significant positive relationship between working capital management strategies (aggressive, hedging, conservative, and uncertain) and risk management. The results also indicated that only conservative strategy has a significant negative relationship with risk management.

**Keywords:** Working Capital Management Strategy, Aggressive Strategy, Conservative Strategy, Hedging Strategy, Risk Management

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**INTRODUCTION**

Capital management is of particular importance, considering its status and significance in organizational processes. The Working Capital accounts for a large portion of an organization's funds, particularly in smaller ones. Managing the capital based on mechanisms of supply chain management is also equally important. The working capital refers to sums of money invested in current assets, and its management involves determining the size and combination of working capital resources and expenditures in an attempt to increase shareholders' wealth (P. Novo, 2007).

Moreover, the increasing importance of working capital in the survival of business activities has led to the development of different strategies for its management. Profitable departments can influence the liquidity of a company by applying different strategies in working capital management. Each of these different strategies has different risks and returns. Corporate finance managers also choose between "Aggressive" or "Conservative" strategies or a combination of the two, depending on the situation the company faces, as well as their personalities and characteristics (Rahnamay Roodposhti, 2010).

Under certainty, when sales, costs, and time of payment are known, companies hold current assets at the lowest level. Keeping more than a required level of working capital increases the cost of financing and reduces profits while keeping any less than the minimum level required delays the fulfillment of commitments to suppliers, results in loss of sales due to a lack of inventory, and restricts the use of credit.

In a climate of uncertainty, on the other hand, companies are required to maintain cash and inventory at the minimum level based on expected payments, sales, and order time, as well as an additional sum, known as "safety stock." Moreover, the amount of accounts receivable is determined by credit terms; the better the credit conditions, the more accounts receivable will be available for a given level of sales. An aggressive investment policy regarding current assets keeps cash and inventory at a low level. This policy increases the risk of falling behind in paying debts and the risk of losing customers.

Aggressive policy often yields the most returns, but at the same time, it carries a high risk. Conservative policies do the opposite.

Managers of profitable business units need to select appropriate strategies for managing their working capital to increase return, liquidity, and debt payment ability, and finally, continue their activities in different situations considering internal and external factors, risks, and return. "Working Capital" is one source of financing, especially for small and medium-sized businesses, as well as growing enterprises. Business executives are required to make decisions about "working capital management" daily. For example, maintaining a high volume of inventories reduces the costs of possible interruptions in the production cycle or business losses caused by product shortages, reduces supply costs, and protects the company against price fluctuations, while enhancing commercial credit of sales from different aspects. Investing heavily in stocks and acquiring commercial credit reduces risk as well as profitability (Lazaridis & Tryfonidis, 2006). The amount of investment in current assets and working capital management is a management concern. Management seeks to maintain market share and retain its customers and suppliers' trust on the one hand, and increase its profitability on the other. Therefore, handling short-term assets and liabilities calls for particular attention because working capital management plays an essential role in the profitability and liquidity of companies, as well as their risk and return. The ultimate goal of any company is to "create value for stakeholders", and "Profitability" is a vital component of this objective. Likewise, "liquidity retention" is an essential goal for business units. However, an increase in corporate profits generally does not improve liquidity, and the two strategic goals do not always work in harmony. Serious problems may arise if the increase in profit depends on the consumption of liquidity. Therefore, the two goals must be distinguished clearly, not to sacrifice one for the other. On the one hand, disregard for profitability jeopardizes the survival of a business in the long run, and on the other hand, negligence of liquidity may render the company unable to pay its debts and, eventually, bankrupt.

According to risk-return theory, higher-risk investments yield higher returns. Therefore, the working capital of companies with higher liquidity may be exposed to less risk at lower profitability. Conversely, if a company whose liquidity level is lower than its working capital faces high risk, this leads to greater profitability. The issue at hand is the management of working capital. The company should consider all the issues in the accounts and try to balance risk and return.

Despite the significance of working capital for organizations, organizational literature has traditionally focused on the study of long-term financial decision-making, with researchers focusing on the study of investment analysis, capital structure, profit sharing, organizational valuation, and similar topics. However, it should be noted that investments in short-term assets and less-than-one-year resources constitute the bulk of the company's balance sheet items (Garcia & Martin & Martin, 2007). In such an economic climate, where international organizations seek new ways to grow and improve financial performance and reduce risk, working capital is considered an essential source of financial performance improvement (Gundavelli, 2006).

Companies can use a variety of strategies in managing current assets and liabilities, and the right combination of these various strategies can help develop a policy to bring working capital to the desired level.

Although risk is an integral part of any financial activity, it was not before the 1990s that risk management became a primary task of banks and other financial institutions. The rise of risk management to prominence can be partially attributed to the considerable losses some of the world's largest corporations suffered throughout the 1990s that shocked financial institutions and led them to place greater emphasis on risk management and control. The main questions of this study include: What is the relationship between working capital management strategies and risk management? How does a working capital management strategy cover their risks of selection and implementation? What is the best approach to selecting working capital management strategies? Is it possible to find the answer?"

### **Theoretical Framework**

Molina, C. & L. Preve (2008) and Afza T and MS Nazir (2007) showed in separate studies that, when comparing companies in competitive industries, companies with centralized industries are highly dependent on credit policies when facing a lack of financial budget. Companies under financial distress limit their financial prosperity and the ability to generate liquidity. Moreover, financial distress can force an investment company to cut down its working capital by collecting receivables, offering low levels of credit sales, cash in assets, and reduce the credit rating of its lenders. Molina and Preve showed that, under financial distress, corporates notably cut down on the commercial credit of their wealthy partners. We expect the working capital requirements to be inversely related to foreclosing and auctioning of properties to settle debts.

The research of Kim, J. B. & L. Zhang (2010) on the relationship between conservative accounting and stock price decline in the United States shows that conservative accounting prevents managers from withholding bad news and, therefore, reduces the likelihood of plummeting stock prices. Nobanee, H. (2010) suggests that there is a traditional relationship between the cash conversion cycle and corporate profitability. In fact, as the cash conversion cycle slows, corporate profitability accelerates, and vice versa. Moreover, identifying the optimal level of inventories, accounts receivable, and accounts payable (where maintenance and opportunity costs are minimized) and recalculating the cash conversion cycle based on these optimal values provide a comprehensive and accurate insight into the performance of working capital management. According to this researcher, the cash conversion cycle is the most comprehensive and accurate criterion for evaluating working capital management. Federal Reserve (2008) has studied best practices to investigate working capital to reduce risk and achieve maximum returns. The results of this study indicated that working capital strategies for risk reduction should be considered in the chain of business activities. Zanjirdar and Shafati (2013) state that there is a direct relationship between the average receiving period of accounts receivable and the cash conversion cycle with full disclosure of information, while no significant relationship exists between the inventory turnover period and the average payment period of accounts payable with full disclosure of information. Shamekhi and Goodarzi (2012) showed a significant relationship between working capital management and earnings smoothing and declared the period of receipt has an inverse and significant relationship with claims and smoothing. In addition, no significant relationship was identified between the cash conversion cycle and earnings smoothing. It should be mentioned that the results of the hypotheses were measured under the assumption of the existence of control variables.

In his study, Tajmir Riahi (2012) first provided a different way of looking at financial bank accounts, in other words, from a risk management perspective presenting an ROE analysis of commercial banks in risk management variables. Second, he measured the risk management capabilities of banks by multivariate techniques and, third, suggested that risk management, as a major criterion for bank stock returns, is more reliable than standard factors used in research, including market returns and revenue growth. Khosh Sima and Shahiki Tash (2012) found a significant relationship between credit and operational risk, liquidity, and efficiency in the Iranian banking system.

Hosseini and Motahhari (2012) showed that the use of corporate risk management techniques has a significant positive relationship with organizational performance and, in terms of subsidiary hypotheses, only strategic risk management has no significant relationship with organizational performance.

Thus, the theoretical framework of the research is as follows:

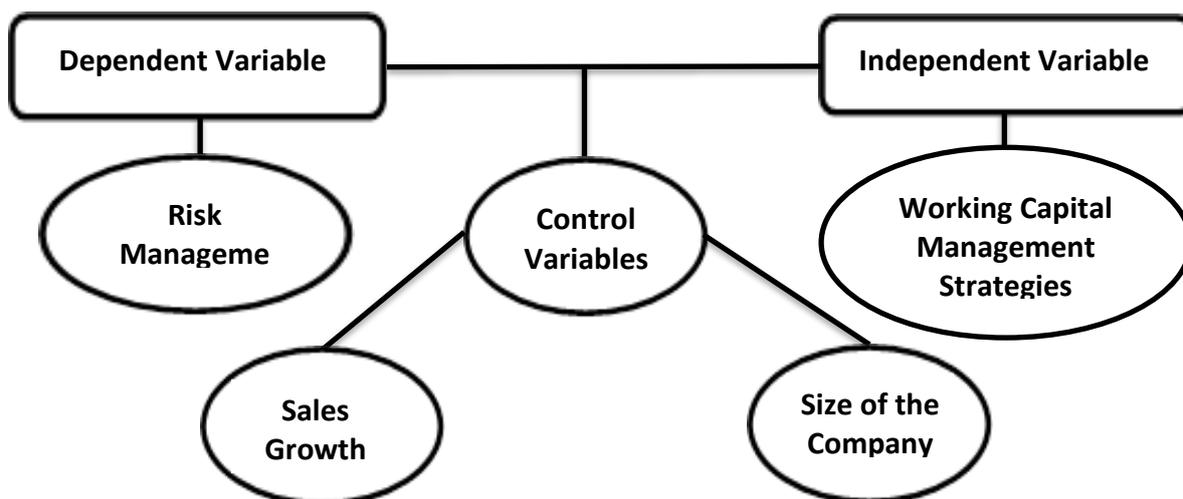


Figure 2.2. Theoretical Framework of the Research

One hypothesis and four sub-hypotheses were devised as follows to achieve the research objectives:

**The Hypothesis:** A significant relationship exists between working capital management strategies and risk management of companies listed on the stock exchange market.

**Sub-Hypothesis (1):** A significant relationship exists between the aggressive working capital management strategy and the risk management in these companies.

**Sub-Hypothesis (2):** A significant relationship exists between the hedging working capital management strategy and the risk management in these companies.

**Sub-Hypothesis (3):** A significant relationship exists between the conservative working capital management strategy and the risk management in these companies.

**Sub-Hypothesis (4):** A significant relationship exists between the uncertain working capital management strategy (unspecified companies) and risk management.

#### Regression Model

The first step to test research hypotheses is to provide a precise and convenient definition of the variables that allow the characteristics in question to be quantified. In order to test the hypotheses, variables of this research were divided into two groups of independent and dependent variables. This study uses liquidity ratios, including quick and current ratios, to represent working capital. The regression model was used to investigate the hypothesis and the sub-hypotheses is as follows:

$$SD_{ROE} = \beta_0 + \beta_1 (CR)_{it} + \beta_2 (ACR)_{it} + \beta_3 (LEV)_{it} + \beta_4 (CCC)_{it} + \beta_5 (NTC)_{it} + \beta_6 (SIZE)_{it} + \beta_7 (SALE_{GROWTH}) + \epsilon_{it}$$

\* The main variables include current and quick ratio, debt, cash flow, and the net trade cycle, and control variables include size and sales growth.

#### Dependent Variables

Inspired by the work of Dr. Faris Nasif al-Shubiri (2011), the above models relied on the standard deviation of Return on Equity (ROE) to represent the risk management.

ROE is the return on equity and is derived from the pre-tax profit to equity ratio.

**A) Working Capital Strategies:** In this research, working capital strategies were tested as independent variables and risk management as dependent ones. Independent research variables include working capital strategies, which are qualitative variables. Therefore, these variables were quantified for analysis in the form of quick, current, and debt ratios to be compared with the industry average. As mentioned before, these ratios represent different strategies in different states. Where it was not possible to

identify the conditions, the strategy was assumed uncertain. The rationale behind these strategies are as follows:

- 1) If both quick and current ratios are above industry average:
  - The debt ratio exceeds the expected industry average, implicating a hedging strategy was adopted.
  - The debt ratio is close to or below the industry average, implicating a conservative strategy was adopted.
- 2) If both quick and current ratios are below industry average:
  - The debt ratio is below the expected industry average, implicating a hedging strategy was adopted.
  - The debt ratio is close to or above industry average, implicating an aggressive strategy was adopted.
- 3) If one of the quick or the current ratios is close to the industry average while the other exceeds it:
  - The debt ratio is above the industry average, implicating a hedging strategy was adopted.
  - The debt ratio is below the industry average, implicating a conservative strategy was adopted.
- 4) If one of the quick or the current ratios is close to the industry average while the other falls behind:
  - The debt ratio is below or close to the industry average, implicating a hedging strategy was adopted.
  - The debt ratio is above the industry average, implicating an aggressive strategy was adopted.
- 5) If one of the quick or the current ratios exceeds the industry average while the other falls behind:
  - The debt ratio is close to the industry average, implicating a hedging strategy was adopted.
  - The debt ratio is below or close to the industry average, implicating an uncertain strategy was adopted.

By "above," "below," and "close to" industry average we mean the following:

- 1) *Above:* above average, with over 25% standard deviation
- 2) *difference*
- 3) *Close to:* within a 25% standard deviation range of the average.
- 4) *Below:* below average, with over 25% standard deviation difference

This classification, compared to a binary classification of above and below average, improves accuracy and helps distinguish between strategies in near-average cases.

**B) Industry Type:** The research hypotheses were examined first, using data from all industries and, then, in separate industries to evaluate and measure the impact of the industry type on the strategy and risk management.

**Independent Variables**

An independent variable is a variable based on which the dependent variable is determined or predicted. It is also referred to as the stimulus or input variable and is a variable that is measured, adjusted, and selected by the researcher to evaluate its relationship with another variable.

- ✓ CR: the current ratio, which is equal to the ratio of current assets to current liabilities
- ✓ ACR: the quick ratio, which is equal to current assets minus the inventory divided by the current debt
- ✓ LEVERAG: the debt ratio that is obtained by dividing total debt by total assets (Sun et al., 2012).
- ✓ CCC (Cash Conversation Cycle): the cash flow of a company, which is calculated by adding the average collection period to the number of days of inventory trading and deducting the average payment period (Taghizadeh Khanqah et al., 2012). In other words:  
 $CCC = ACP + ITID - APP$
- ✓ ACP (Average Collecting Period): equals accounts receivable divided by net sales multiplied by 365 (Taghizadeh Khaneghah et al., 2012)
- ✓ ITID (Inventory Turnover In Days): the number of days the inventory is traded, which is equal to the inventory divided by the cost of goods sold multiplied by 360 (Taghizadeh Khaneghah et al., 2012)
- ✓ APP (Average Payment Period): equals accounts payable divided by the purchase multiplied by 365 (Taghizadeh Khanqah et al., 2012)
- ✓ NTC (Net Trading Cycle): equals the average period of accounts receivable plus the ratio of inventory divided by net sales (multiplied by 365) minus the average payment period of the company (Taghizadeh Khanqah et al., 2012)
- ✓ SIZE: the size of a company is obtained from the natural logarithm of the carrying value of all its assets (Hussein et al., 2012)
- ✓ SALEGROWTH: the net sales of the current year deducted net sales of the previous year and divided by net sales of the previous year:  
 $(\text{Net sales of the previous year} - \text{Net sales of the current year}) / (\text{Net sales of the previous year})$

✓  $\epsilon_{it}$  = error term

**METHODOLOGY**

This study is a descriptive research as far as data collection is concerned and adopts a retrospective approach. It is an applied research, for it supports the practice of the information and a developmental research in terms of its objectives and a panel (data) analysis. The statistical analysis was conducted with the help of a software package, and the research hypotheses were tested by regression and correlation analyses. The significance of the models was also measured using the coefficient of determination ( $R^2$ ), correlation coefficient, and the t-statistic. Correlation or consistency analysis includes all methods in which the relationship between different variables is identified using a regression model. The purpose of the correlation analysis is to study the association of changes in one or more variables with one or more other variables.

The statistical population of the present study consists of all companies listed on the Tehran Stock Exchange. Screening (elimination) was carried out at first to obtain a sample that is a good representative of the target population. Accordingly, the following criteria were assumed, and the companies had to meet them all to be included in the statistical population. By considering the above criteria and going through the said steps, 140 eligible companies were selected.

Information on the theoretical foundations of the research was collected from Farsi and Latin books and articles, the data required for testing the hypotheses were obtained from the audited financial statements of the reviewed companies, as well as from the Rahavard Novin Data Database, and—where necessary—www.rsid.ir. The statistical analyses were carried out using Excel and Eviews7.

**Findings**

The studied variables are summarized in Table 4.1. The reported statistics include the mean, median, maximum, minimum, kurtosis, skewness, and standard deviation of the variables used in this study.

**Table 4.1 Descriptive Statistics for Research Variables**

Variables	ROE	ACR	CCC	CR	LEVERAG E	NTC	SALEGROWT H	SIZE
Mean	2.575048	0.820816	259.0423	1.441245	0.649173	152.1656	0.298398	5.821126
Median	1.586125	0.770000	173.1293	1.210000	0.640000	128.8831	0.150201	5.759638
Maximum	24.61218	5.530000	1208.30	8.100000	3.060000	2161.129	113.3897	8.056021
Minimum	0.005368	0.080000	668.2041	0.200000	0.100000	-787.6501	-0.787121	4.265407
Standard Deviation	5.142550	0.482049	960.130200	3.480762	0.239239	188.7732	3.635214	0.635514
Skewness	10.375190	3.187300	13.57171	29.34457	2.589614	1.782423	30.77333	0.760385
Kurtosis	145.8668	21.266720	195.7376	898.1215	23.07446	19.37998	957.7660	4.180105
Total Observations	2523.547	804.4000	253862.0	1412.420	636.1900	149122.3	292.4299	5704.704
	980	980	980	980	980	980	980	980

Source: research findings

**Estimation of Model 1) Investigating the Relationship between Working Capital Strategies (aggressive companies) and Risk Management**

The first model examined the relationship between the working capital management strategy of companies with aggressive strategies and risk management, which seeks to investigate the hypothesis that a significant relationship exists between the

aggressive working capital management strategy and risk management. Fifty-one of the reviewed companies adopted an aggressive strategy, which was studied by this model.

First, the Chow and Hausman detection test was employed to determine the appropriate estimation method for this model. The test results of investigating fixed and random effects in the calculations performed by Eviews7 are presented in Table 4.2.

**Table 4.2 The Result of Fixed Effect Test (Aggressive Strategy)**

Effect Test	Statistic	Prob
Cross-Section F	4.339204	0.1939
Cross-Section Chi-Square	172.159341	0.0818

Source: research findings

The p-value of the Chow statistic was obtained at 0.19; therefore, the integrated data estimation method was accepted. In conclusion, the data in these companies are pool type and not panel type.

**Table 4.3 Estimation Results of Model 1**

Independent Variables	Abbreviation	Estimation Coefficient	t-Statistic	Probability (prob)	Value
Quick Ratio	ACR	0.008956	0.021108	0.9832	
Cash Conversion Cycle	CCC	0.012682	2.513040	0.0483	
Current Ratio	CR	0.018427	2.633318	0.0135	
Debt Ratio	LEVERAGE	2.734148	4.967236	0.0000	
Net Trading Cycle	NTC	0.000370	2.277203	0.0425	
Sales Growth	SALEGROWTH	-0.749588	-3.057438	0.0024	
Company Size	SIZE	0.373170	2.629315	0.0090	
Intercept	C	-2.342816	-2.341398	0.0199	
Autocorrelation Coefficient of R <sup>2</sup> Determination	AR(1)	0.078826	3.682497	0.0135	
F-Statistic	F-Statistic	5.909306	-	0.0000	

Source: research findings

**Interpreting the Investigation of Companies with Aggressive Strategy**

- ✓ The study results show a statistically significant positive relationship between working capital and risk management in companies that have adopted an aggressive strategy in the sense that a unit increase in the working capital increases the risk by 0.012 units. The risk-based strategy emphasizes an aggressive policy of financing.
- ✓ The study results indicate a positive but statistically insignificant relationship between quick ratio and risk management.
- ✓ The study results show that a statistically significant positive relationship exists between the current ratio and risk management, with the risk increasing by 0.018 with every unit increase in the current ratio.
- ✓ The study results show a positive and significant relationship between debt ratio and risk management as the risk in the companies with aggressive strategy increases by the increase in the debt ratio. A unit increase in debt risk ratio increases the risk by 2.73 units, underscoring the aggressiveness of the strategies these companies adopted.
- ✓ The results show a statistically significant positive relationship between the net trading cycle and risk management.
- ✓ The results indicate a significant negative relationship between sales growth and risk management, meaning that for a unit increase in sales growth, the risk is reduced by 0.79 units.
- ✓ The results show that there is a statistically significant positive relationship between the size of the company and risk management, meaning that the risk increases by

0.37 units for a unit increase in the size of the company. That is because company size comprises some risky aspects that the calculated coefficient cannot explain (French, 1995).

- ✓ AR variable (1) was fed to the model for evaluating the autocorrelation. The results show a lack of autocorrelation in the investigated model.
- ✓ The coefficient of determination (R<sup>2</sup>) is 0.33, indicating that the independent variables account for 33% of the dependent variable.
- ✓ The F-statistic has a significance level of 0.000, indicating the overall validity of the model at a 99% level of significance.
- ✓ Heteroskedasticity in panel data was controlled by the generalized least squares method, through Period Seemingly Unrelated Regressions (PSUR), thus solving the problems of autocorrelation and heteroskedasticity in the studied model.

**Estimation of Model 2) Investigating the Relationship between Working Capital Strategies (hedging companies) and Risk Management**

The second model examined the relationship between the working capital management strategy of companies with hedging strategies and risk management, which seeks to investigate the hypothesis that there is a significant relationship between the hedging working capital management strategy and risk management. Twenty-six of the reviewed companies had a hedging strategy, which was studied by this model.

First, the Chow and Hausman detection test was employed to determine the appropriate estimation method for this model. The test results of investigating fixed and random effects in the calculations performed by Eviews7 are presented in Table 4.4.

**Table 4.4 The Result of Fixed Effect Test (Hedging Strategy)**

Effects Test	Statistic	Prob
Cross-Section F	1.651719	0.0356
Cross-Section Chi-Square	44.541157	0.0094

Source: research findings

**Table 4.5 The Result of Random Effect, Hausman Test (Hedging Strategy)**

Effect Summary	Chi-Sq. Statistic	Prob
Cross-Section Random	59.238457	0.0360

Source: research findings

The p-value of the Chow statistic was obtained at 0.035, rejecting the integrated data estimation method. The Hausman statistic was also 0.036, indicating that fixed effect estimation is more appropriate for the second model.

**Table 4.6 Estimation Results of Model 2 (Companies with Hedging Strategy)**

Independent Variables	Abbreviation	Estimation Coefficient	t-Statistic	Probability (prob)	Value
Quick Ratio	ACR	6.72E-05	1.994753	0.0479	
Cash Conversion Cycle	CCC	-0.7459230	-1.5489030	0.1235	
Current Ratio	CR	1.252378	2.989609	0.0033	
Debt Ratio	LEVERAGE	0.514646	2.264817	0.0250	
Net Trading Cycle	NTC	2.531083	3.483295	0.0007	
Sales Growth	SALEGROWTH	1.17E-06	0.122151	0.9029	
Company Size	SIZE	-0.3455530	-2.2891350	0.0235	
Intercept	C	1.411332	0.992327	0.3227	
Coefficient of Determination	R <sup>2</sup>	0.4084240	-	-	
F-Statistic	F-Statistic	3.1931040	-	0.000001	

Source: research findings

**Interpreting the Results Related to Companies with Hedging Strategy**

- ✓ The study results show a statistically significant positive relationship between working capital and risk management in companies that have adopted a hedging strategy in the sense that a unit increase in the working capital slightly increases the risk.
- ✓ The study results indicate a negative relationship with borderline significance (at 88%) between quick ratio and risk management, with the risk decreasing by 0.74 units for a unit increase in quick ratio in companies adopting a hedging strategy.
- ✓ The results reveal a statistically-significant, positive relationship between the current ratio and the risk management, where the risk increases by 1.23 for a unit increase in the current ratio.
- ✓ The study results show a positive and significant relationship between debt ratio and risk management as the risk in the companies with hedging strategy increases by the increase in the debt ratio. A unit increase in the debt risk ratio increases the risk by 0.51 units.
- ✓ The results show a statistically significant positive relationship between the net trading cycle and risk management.
- ✓ The results also indicate a statistically insignificant negative relationship between sales growth and risk management.
- ✓ The results show that there is a statistically significant positive relationship between the size of the company

and risk management, meaning that for a unit increase in the size of the company, the risk decreases by 0.34 units. In other words, the bigger the company, the lower the risk.

- ✓ The coefficient of determination, R<sup>2</sup>, is 0.40, indicating that the independent variables account for 40% of the dependent variable.
- ✓ The F-statistic had a significance level of 0.000, indicating the overall validity of the model at a 99% level of significance.
- ✓ Heteroskedasticity in panel data was controlled by the generalized least squares method, through Period Seemingly Unrelated Regressions (PSUR), thus solving the problems of autocorrelation and heteroskedasticity in the studied model.

**Estimation of Model 3) Investigating the Relationship between Working Capital Strategies (conservative companies) and Risk Management**

The third model examined the relationship between the working capital management strategy of companies with conservative strategies and risk management, which seeks to investigate the hypothesis that there is a significant relationship between the conservative working capital management strategy and risk management. Forty of the reviewed companies adopted a conservative strategy, which was studied by this model.

The test results of investigating fixed and random effects in the calculations performed by Eviews7 are presented in Table 4.7.

**Table 4.7 The Result of Fixed Effect Test (Conservative Strategy)**

Effects Test	Statistic	Prob
Cross-Section F	1.084168	0.03493
Cross-Section Chi-Square	45.530098	0.1873

Source: research findings

The p-value of the Chow statistic was obtained at 0.34; therefore, the integrated data estimation method was accepted. All intercepts were also equal.

**Table 4.8 Estimation Results of Model 3 (Companies with Conservative Strategy)**

Independent Variables	Abbreviation	Estimation Coefficient	t-Statistic	Probability Value (prob)
Quick Ratio	ACR	-0.147862	-4.493742	0.6220
Cash Conversion Cycle	CCC	-0.000193	-4.364358	0.0000
Current Ratio	CR	0.628627	2.369458	0.0187
Debt Ratio	LEVERAGE	-0.022635	-0.116192	0.9076
Net Trading Cycle	NTC	3.009218	3.807416	0.0002
Sales Growth	SALEGROWTH	-3.95E-0.5	-0.178442	0.08585
Company Size	SIZE	-0.510451	-2.846043	0.0048
Intercept	C	-3.390371	-2.349021	0.0197
Coefficient of Determination	R <sup>2</sup>	0.392364	-	-
F-Statistic	F-Statistic	3.257315	-	0.00000

Source: research findings

**Interpreting the Results Related to Companies with Conservative Strategy**

- ✓ The study results show a statistically significant negative relationship between working capital and risk management in companies that have adopted a conservative strategy in the sense that a unit increase in the working capital decreases the risk by 0.0002. The level or combination of working capital in companies depends on the risk aversion attitude of their managers. Conservative managers typically tend to select a working capital size and combination that reduces the risk—a fact confirmed by the results of this study.
- ✓ The study results indicate a negative and insignificant relationship between quick ratio and risk management.
- ✓ The study results reveal a statistically significant positive relationship between the current ratio and risk management, with the risk increasing by 0.62 for a unit increase in the current ratio.
- ✓ The study results show an insignificant negative relationship between debt ratio and risk management.
- ✓ The results show a statistically significant positive relationship between the net trading cycle and risk management. A unit increase in the net trading cycle increases the risk by three units. The net trading cycle is the most influential variable on the risk management among the variables investigated in this study.
- ✓ The results indicate an insignificant negative relationship between sales growth and risk management.
- ✓ The results show that there is a statistically significant negative relationship between the size of the company and risk management, meaning that for a unit increase in

the size of the company, the risk decreases by 0.51 units. In other words, the bigger the company, the lower the risk.

- ✓ The coefficient of determination, R<sup>2</sup>, is 0.39, indicating that the independent variables account for 39% of the dependent variable.
- ✓ The F-statistic has a significance level of 0.000, indicating the overall validity of the model at a 99% level of significance.
- ✓ Heteroskedasticity in panel data was controlled by the generalized least squares method, through Period Seemingly Unrelated Regressions (PSUR), thus solving the problems of autocorrelation and heteroskedasticity in the studied model.

**Estimation of Model 4) Investigating the Relationship between Working Capital Strategies (uncertain companies) and Risk Management**

The fourth model examined the relationship between the working capital management strategy of companies with uncertain strategies and risk management, which seeks to investigate the hypothesis that there is a significant relationship between the uncertain working capital management strategy and risk management. Twenty-three of the reviewed companies adopted an uncertain strategy, meaning that these companies were not studied under any group of strategies. As the number of companies suggests, most of the companies in the statistical population had adopted a specific strategy in their plans.

The test results of investigating fixed and random effects in the calculations performed by Eviews7 are presented in Table 4.9.

**Table 4.9 The Result of Fixed Effect Test (Uncertain Strategy)**

Effects Test	Statistic	Prob
Cross-Section F	1.032331	0.4326
Cross-Section Chi-Square	39.839197	0.1920

Source: research findings

The p-value of the Chow statistic was obtained at 0.43; therefore, the integrated data estimation method was accepted. All intercepts were also equal.

**Table 4.10 Estimation Results of Model 4 (Companies with Uncertain Strategy)**

Independent Variables	Abbreviation	Estimation Coefficient	t-Statistic	Probability Value (prob)
Quick Ratio	ACR	4.717126	2.185816	0.0303
Cash Conversion Cycle	CCC	0.007546	2.458845	0.01050
Current Ratio	CR	3.245320	2.304260	0.0225
Debt Ratio	LEVERAGE	27.72685	3.560437	0.0005
Net Trading Cycle	NTC	-0.001987	-0.699286	0.4854
Sales Growth	SALEGROWTH	0.108935	2.811856	0.0055
Company Size	SIZE	-0.130338	-0.425475	0.6711
Intercept	C	-24.25728	-2.804672	0.0057
Coefficient of Determination	R <sup>2</sup>	0.294862	-	-
F-Statistic	F-Statistic	9.677467	-	0.00000

Source: research findings

#### Interpreting the Results Related to Companies with Conservative Strategy

- ✓ The study results show a statistically significant positive relationship between working capital and risk management in companies that have adopted an uncertain strategy in the sense that a unit increase in the working capital increases the risk by 0.007 units.
- ✓ The study results indicate a statistically significant positive relationship between quick ratio and risk management, meaning that a unit increase in quick ratio results in a 4.71 units increase (در متن دقیقاً مشخص نیست افزایش می‌یابد یا کاهش-مترجم) in risk in companies with uncertain strategies.
- ✓ The study results show a statistically significant positive relationship between the current ratio and risk management, with the risk increasing by 3.24 units for a unit increase in the current ratio.
- ✓ The study results show a significant positive relationship between debt ratio and risk management, with the increase in debt ratio increases the risk in companies with uncertain strategies. In other words, a unit increase in debt ratio increases the risk by 27.72 units, underscoring that this variable is the most effective among all the variables studied for the fourth model.
- ✓ The results show a statistically insignificant negative relationship between the net trading cycle and risk management.
- ✓ The results indicate a statistically significant negative relationship between sales growth and risk management, meaning an increase in sales growth increases the risk in companies with uncertain strategies. This outcome can be justified considering the fact that many companies take on more risky activities during an increase in their profitability following sales growth. The resulting coefficient shows that the risk increases by 0.1 unit for a unit increase in sales growth of companies adopting an uncertain strategy.
- ✓ The results show that there is a negative and statistically insignificant relationship between the size of the company and the risk management.
- ✓ The coefficient of determination, R<sup>2</sup>, is 0.29, indicating that the independent variables account for 29% of the dependent variable.
- ✓ The F-statistic has a significance level of 0.000, indicating the overall validity of the model at a 99% level of significance.
- ✓ Heteroskedasticity in panel data was controlled by the generalized least squares method, through Period Seemingly Unrelated Regressions (PSUR), thus solving the problems of autocorrelation and heteroskedasticity in the studied model.

#### DISCUSSION AND CONCLUSION

The results of this study are based on four models for aggressive, hedging, conservative, and uncertain strategies in companies listed on the Tehran Stock Exchange over a seven-year period (2006 to 2012). The study was conducted based on reliable research, and the estimates can be interpreted as follows.

In the first model, we sought to find out whether a significant relationship can be established between working capital management and risk management in firms adopting an aggressive strategy. The data analysis results show that in the model used to study the relationships between working capital and risk management in companies that embarked on an aggressive strategy, a statistically significant positive relationship exists where a unit increase in working capital increases the risk by 0.012 units. The risk-based strategy emphasizes an aggressive policy of financing. Shin and Soenen (1998) concluded that lowering the level of current assets to an acceptable level increases the profitability of the company. The results confirm the first hypothesis of the study. That is, as stated in previous chapters, the reduction of the level of current assets and liquidity promotes aggressive policies, leading to an increased risk and profitability. The results of various researches, such as Smith (1980) and Troll and Solano (2004), as well as the study conducted by the Federal Reserve (2008), indicate that the strategy chosen for working capital has a significant impact on risk. The results of the present study are consistent with the reviewed works, providing evidence for the effect of working capital policies on risk. The results are also in line with the results of Hasanpour (2009), which showed that the average returns in different strategies are significantly different, with aggressive strategy having the highest return among other strategies in the entire industry.

The results also show that there is a positive relationship between the variables of the Current Ratio, Quick Ratio, Debt Ratio, and Net Trading Cycle (NTC) and risk management of the companies that adopted the aggressive strategy, indicating that a unit increase in each of these variables increases the risk. The results also show that there is a statistically significant negative relationship between sales growth and risk management, meaning that for a unit increase in sales growth, the risk is reduced by 0.79 units. Moreover, the results show that there is a statistically significant positive relationship between the size of the company and risk management, meaning that for a unit increase in the size, the risk increases by 0.37 units. That is because the company size carries aspects of risk that the resultant coefficient cannot explain, which supports the results of Fama and French (1992 and 1995). In general, findings of the model support Hypothesis 1, that a significant (and positive, as expected) relationship exists between aggressive strategy and risk management.

In the second model, we sought to find out whether there is a significant relationship between working capital management and risk management in companies with a hedging strategy.

The data analysis results show that a statistically significant positive relationship exists in the model used to examine the relationships between working capital and risk management in the companies that implemented a hedging strategy. That means a unit increase in the working capital translates to an increased risk, but not as much as those companies that pursue an aggressive strategy. Therefore, the optimal level of working capital balances risk with the return, which requires close control over working capital components such as cash, accounts receivable, inventory, and accounts payable.

The results of the present study are consistent with previous works, providing evidence that shows the impact of working capital policies on risk. This conclusion is consistent with the research by Inrob and Vischer (1996), which demonstrated a significant and robust correlation between industrial property and current liquidity policies, stating that relatively-aggressive working capital policies are balanced with relatively-conservative working capital financial policies. Moreover, the results of the regression test show that there is a positive relationship between the variables of current ratio, debt ratio, net trading cycle, sales growth, and risk management in the companies adopting hedging strategy, meaning that an increase in any of these variables also increases the risk. The results are also indicative of the negative relationships of the quick ratio and company size with risk management, meaning that for a unit increase in the size of the company, the risk is reduced by 0.34 units. The larger the company, the lower the risk. In general, the results obtained from the model support Hypothesis 2 that there is a positive and significant relationship between hedging strategy and risk management.

In the third model, we tried to find out whether there is a significant relationship between working capital management and risk management in companies with a conservative strategy. The data analysis results for companies that pursued a conservative strategy show a statistically significant negative relationship between working capital and risk management, where the risk is reduced by 0.0002 units for a unit increase in working capital. The level and combination of working capital in companies depend on the risk aversion attitude of their managers. Conservative managers typically tend to administer a working capital size and combination that reduces the risk, which is confirmed by the results of the present study. Similar to the findings of this study, Zhang and Kim (2010) showed in an investigation of the relationship between conservative accounting and stock risk in the US that the conservative strategy prevents managers from withholding bad news, which reduces the stock risk. In his study on working capital management and profitability, Nabanee (2010) also talks about a traditional relationship between the cash conversion cycle and the profitability of the company. According to him, a reduction of the cash conversion cycle increases profitability and vice versa, which is consistent with the results of the present study for conservative companies.

The results also reveal the statistically significant, positive relationships of the current ratio and the net trading cycle with risk management. In contrast, risk management was found to have negative relationships with quick ratio, debt ratio, the size of the company, and sales growth.

The results of the model generally support Hypothesis 3 that a significant negative (based on the theoretical foundations) relationship exists between conservative strategy and risk management and that this relationship.

In the fourth model, we tried to find out whether there is a significant relationship between working capital management and risk management in companies with uncertain strategies. The results of the research show that, in the companies that pursued uncertain strategies, a statistically significant positive relationship exists between working capital and risk management, where a unit increase in working capital increases the risk by 0.007 units. Moreover, the results of the study indicate a statistically significant positive relationship between quick ratio, current ratio, debt ratio, and sales growth and risk management, where a unit increase in each of these variables leads to an increased risk. Negative relationships

were also identified between the net trading cycle and company size and risk management where a unit increases in the net trading cycle and company size reduces risk in companies adopting an uncertain strategy.

The results obtained from the model generally support Hypothesis 4 that there is a significant relationship between uncertain strategy and risk management.

Therefore, it can be stated that all four research hypotheses that were set forth to investigate the existence of a significant relationship between working capital management and risk management were confirmed. In brief, the relationship between working capital management and risk management in companies with aggressive strategies is positive, and the more aggressive the strategy of the company, the higher the risk. Moreover, from the four strategies studied, only the conservative strategy had a negative relationship with risk management. As explained in the measurement of working capital, the larger the calculated value, the more conservative the policy, and vice versa, meaning that a more conservative working capital policy reduces the risk. This type of relationship is consistent with our expectations because it is expected for companies to face higher risks as they adopt more aggressive policies. However, the conclusions of this study must be exercised with caution as further studies are required considering different periods and a larger population of companies. Such a study on this subject is yet to be undertaken in Iran.

Based on the results, the following recommendations can be made to improve the evaluation and decision-making process of individuals and organizations who use financial statements, as well as users of financial information:

- Based on the first hypothesis and its results, it is recommended that companies with poor financial conditions and loss-makers avoid too aggressive strategy because in executing this strategy, the risk of liquidity will increase. Therefore, the company that implements such a strategy will often find itself in a situation where it cannot pay off its outstanding debt, which increases the risk of its bankruptcy.
- Based on the second hypothesis and its results, the level and the mix of working capital depends on the risk-aversion nature of company managers. Conservative managers tend to choose a working capital size and combination that reduces risk, while bold managers make choices that increase equity returns and company value. Therefore, managers of companies adopting hedging strategies are advised to follow a strategy that complies with the status of their company and their goals. Moreover, the results of the research show that adopting an aggressive strategy increases the risk of being unable to fulfill commitments. Therefore, it is recommended that companies practice relevant working capital strategies through risk-return tradeoff, which is at the core of all financial decisions.
- Based on the third hypothesis and its results, in the face of a long-running loss-making or the risk of bankruptcy due to lack of liquidity, or in cases where the receivables are lower than expected and the company fails to extend some overdue debt or to meet unexpected customer orders, business managers are advised to exercise a conservative strategy that allows them to manage and reduce risks through high liquidity.

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