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Working Capital Efficiency and True Performance of Companies in Iran's Capital Market

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Abstract

The main objective of this study was to investigate the relationship between WCM efficiency using the DEA approach and the true performance of Iranian manufacturing firms. 1440 company year observations in 5 industries for the period 2006 to 2021 were used for the analysis. In the present study, the DEA input-oriented BCC model was used. This study also used four input and two output variables to calculate WCM efficiency. The study results showed a positive and significant relationship between working capital efficiency, company size, and company growth opportunities with their performance. The results also showed a negative relationship between leverage and performance. The results of additional tests showed a non-linear inverted U-shaped relationship between working capital efficiency and performance.

Keywords: Data envelopment analysis, Working capital efficiency, True performance.

1 | Introduction

Working Capital Management (WCM), as a key element in short-term investment and financing decisions, plays a critical role in assessing a company's profitability, value, and risk [1]. Fazzari and Petersen [2] believe that working capital is critical for generating company cash flow. Companies that operate with efficient working capital models become very powerful leaders. WCM efficiency helps companies influence their payment cycles and inventory, enabling them to perform better while holding less working capital [3], [4]. In addition, efficient WCM may reduce the likelihood that firms will face funding constraints in future periods [5]. In addition, efficient WCM practices can improve profitability and liquidity without negatively affecting the other. This is because the importance of cash as an indicator of the ongoing financial health of a business is not hidden from anyone [6].

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However, WCM is very difficult and complex due to the inverse relationship between liquidity and profitability. Although the primary goal of any firm is to maximize profits, it is necessary to maintain some (sufficient) liquidity to run its operations smoothly [7]. WCM involves planning and controlling a company's assets and short-term liabilities [8]. The purpose of WCM is to manage the company's current assets and liabilities to maintain a satisfactory level of working capital. Mismanagement of working capital can lead to a liquidity crisis and reduced profitability. Sohail et al. [9] show that WCM directly impacts a company's profitability. Deloof [10] emphasized that the way working capital is managed significantly impacts companies' profitability. WCM is one of a financial manager's most important decisions. The competitive landscape is forcing companies to focus more on increasing profitability. However, this cannot be achieved long-term unless companies develop strategies to increase efficiency as measured by working capital. As a result, WCM has become an important strategy among firms [7] because a firm's working capital policy can affect its liquidity and profitability [11]. WCM issues are important to all companies, regardless of size, sector, industry, country, and type of economy. While WCM is important for companies of all sizes operating in developed and emerging markets WCM, WCM is particularly important for companies operating in emerging markets. Companies in emerging markets are mostly small in size and have limited access to long-term capital markets [6], [7]. Therefore, the present study examines the relationship between WCM efficiency and the true performance of companies in an emerging market such as Iran.

2 | Literature and Extension of Hypotheses

2.1 | Extension of Hypotheses

Appuhami [12] believes that as one of the fundamental decisions in corporate finance, in addition to capital structure decisions and capital budgeting decisions, WCM is also an essential component in corporate finance because efficient WCM leads the company to respond quickly and appropriately to unforeseen changes in market variables. Managers spend considerable time making daily capital decisions because current assets are short-term investments continuously converted into other types of assets [13]. In the case of current liabilities, the company is responsible for the timely payment of the obligations listed in the current liabilities. The liquidity of the current business depends mainly on the operating cash flow generated by the company's assets [14]. As a result, managing a company's working capital is a very sensitive area in financial management [15], [16]. WCM deals with the problems in managing current assets, liabilities, and their interrelationships. Failure to maintain a satisfactory level of working capital is likely to result in insolvency and may even lead to bankruptcy [6].

Therefore, effective WCM is crucial because it affects companies' performance and liquidity [17]. The main objective of WCM is to achieve an optimal balance between its components [18]. Efficient WCM is essential to a company's overall strategy to create shareholder value [19]. Therefore, companies try to maintain an optimal level of working capital that maximizes their value [10].

The relationship between WCM and performance has been examined in various studies. Ghosh and Maji [20], Hosseinzadeh Lotfi et al [21] conducted an empirical study on the relationship between current asset utilization and operating profit in the Indian cement and tea industries. The study concluded that current asset utilization is positively related to the operating profitability of all the companies studied. Chakraborty [22] and Mallik et al. [23] studied the relationship between working capital and profitability regarding selected pharmaceutical companies.

They found that the joint effect of liquidity, inventory management, and credit management on profitability was statistically significant in 9 of 17 pharmaceutical companies selected for the study. Zariyawati et al. [24] examined the relationship between profitability and the length of the cash conversion cycle using six different industries listed on the Malaysian Stock Exchange. Their analysis shows a strong negative significant relationship between the cash conversion cycle and firm profitability. Falope and Ajilore [25] examined the impact of WCM on the profitability of non-financial services companies listed on the Nigerian Stock Exchange (NSE). The results show a negative relationship between net operating profit (dependent variable)

and the independent variables (average payment period, cash conversion cycle, Average collection period, and inventory turnover). The results also show that the firm's size does not affect financial performance. Ahmad et al. [26] studied the effect of working capital on firm performance in Pakistan's cement, chemical, and engineering sectors. The results show that the average collection period, firm size, cash conversion cycle, and operating cycle are positively related.

Meanwhile, leverage, average payment period, and average inventory age negatively relate to return on equity. The results show that WCM affects firm profitability. Siraj et al. [27] analyzed the impact of WCM, i.e., inventory management, receivables management, and payables management, on the performance of non-financial firms in Pakistan. The results indicate that inventory management significantly affects firm growth, and accounts payable management significantly affects firm profitability. However, only accounts receivable management affects profitability and growth.

Therefore, the following hypotheses were declared for the present study:

H1: a linear relationship exists between working capital efficiency and firm performance.

H2: a non-linear relationship exists between working capital efficiency and firm performance.

3 | Methodology

The present study is considered applied in terms of its objective and descriptive-correlational in terms of its method. Since this study uses past data related to financial statements, it is a post-event study. Also, this study is a library and analytical study based on panel data analysis. The general method or type of this research can be determined based on the objective criteria, data collection and inference method, research design, and finally, the type and nature of variables and relationships between them as follows:

3.1 | Research Statistical Population

The research **s**ubject is the relationship between WCM indicators and the performance of listed companies, which include pharmaceutical, chemical, non-metallic minerals, basic metals, and automotive companies listed on the Tehran Stock Exchange. The research period is from the beginning of 2006 to the end of 2021. To conduct this research, samples were taken from current conditions and companies listed on the Tehran Stock Exchange.

I. You must be listed on the Tehran Stock Exchange since the beginning of 2006.

II. The end of companies' fiscal period must be 12/29.

III. To homogenize the statistics, banks, and financial and investment institutions have been excluded.

IV. The required data must be available from different sources.

Considering these conditions, 90 companies were studied over 16 years (1440 observations).

3.1.1 | Research model and variables

Research model

The following is the regression model that will be used to test the research hypothesis:

$$\mathrm{TruP}_{i,t} = \alpha + \beta_1 \mathrm{WCME} + \beta_2 \mathrm{SIZE}_{i,t} + \beta_3 \mathrm{MTB}_{i,t} + \beta_4 \mathrm{LEV}_{i,t} + \beta_5 \mathrm{TANG}_{i,t} + \beta_6 \mathrm{LIQ}_{i,t} + \varepsilon_{i,t}$$

3.1.2 | Operational definitions

Actual company performance (dependent variable), Chen and Lu [28] believe that discretionary accruals modify actual accounting performance. For this purpose, the discretionary accruals to performance measure of Kothari et al. [29] can be used. This measure allows researchers to make more reliable inferences [30].

Therefore, the actual accounting performance (TRUE_ROA) is calculated as follows:

$$\frac{TA_{it}}{A_{it-1}} = \beta_0 + \beta_1 \frac{1}{A_{it-1}} + \beta_2 \frac{\Delta REV_{it}}{A_{it-1}} + \beta_3 \frac{PPE_{it}}{A_{it-1}} + \beta_4 \frac{CF_{it}}{A_{it-1}} + \beta_5 \frac{NI_{it}}{A_{it-1}} + \varepsilon_{it}$$

In the above model, TAit represents total accruals, the difference between operating income and operating cash flow; Ait-1 represents total assets from the previous year. It represents the current year's income change of the prior year (ΔREVit). PPEit is the net tangible fixed assets. CFit is the ratio of operating cash flow to assets. DCFit is a dummy variable that equals one if the operating cash flow is negative and zero otherwise. NIit represents net income [31], [32]. After analyzing the above model and obtaining the error of this model, the resulting error figures are multiplied by the previous year's assets (Ait-1) to obtain the estimated value of discretionary accruals. The actual accounting performance is obtained from the difference between net income and discretionary accruals. To homogenize the data and avoid dispersion, we divide the difference between these figures by the current year's assets (Ait). Working capital efficiency (independent variable), Data Envelopment Analysis (DEA) based on the research of Seth et al. [4] was used to calculate the independent variable of working capital efficiency as shown *Fig. 1*.

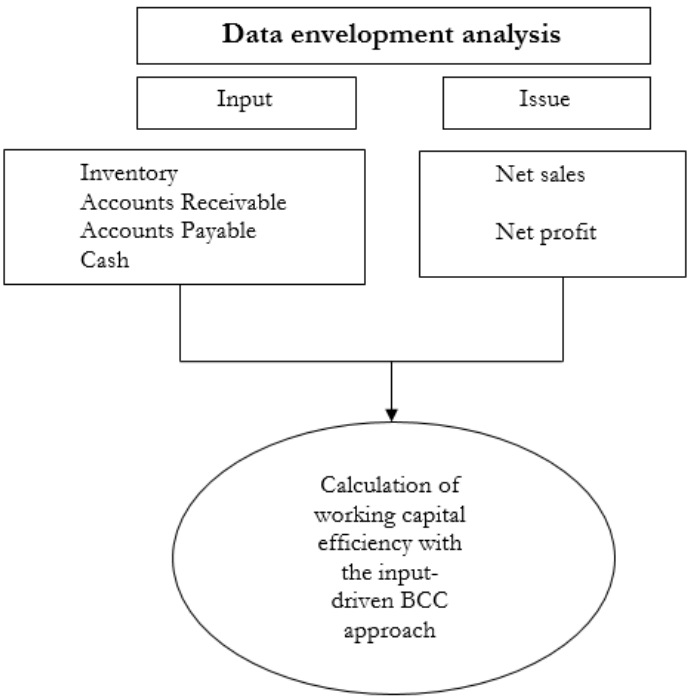

Fig. 1. Calculatation the independent variable of working capital efficiency.

The control variables are:

I. Firm size (Size): logarithm of the book value of total assets.

II. Market potential (MTB): ratio of market value of shares to book value of shares.

III. Leverage (LEV): ratio of total liabilities to total assets.

IV. Tangible asset ratio (TANG): ratio of tangible assets to total assets.

V. Liquidity of assets (LIQ): ratio of current assets to current liabilities.

4 | Research Findings

4.1 | Descriptive Statistics

In this study, four input variables and two output variables were used to calculate working capital efficiency. The descriptive statistics of these variables are shown in *Table 1*.

Table 1. Features of input variables and output variables for the present study.

Variable	Average	SD.
Average inventory	2691.25	7866.16
Average claims	2492.25	6689.56
Average trade payables	1981.39	6209.44
Average cash on hand	3.62	7.19
Average net sales	13964.05	38555.25
Average profit after tax	722.55	2832.25

Calculation of the WCM efficiency values

The present study calculates the relative efficiency of each company in its respective industry, but due to space limitations, the efficiency values of all companies are not shown in *Table 2*.

Table 2. Selected companies' WCM efficiency.

Variable	1395	1396	1397	1398	1399	1400
Min	0.125	0.115	0.145	0.025	0.095	0.085
Max	1.00	1.00	1.00	1.00	1.00	1.00
Mean	0.625	0.615	0.633	0.629	0.601	0.644
Median	0.615	0.618	0.630	0.620	0.644	0.612

Table 2 confirms the wide variation in WCM efficiency scores among manufacturing companies. Maximum values up to 1,000 indicated efficient companies, while minimum values were 0.070-0.166. This highlights the gap between efficient and inefficient companies in WCM. Furthermore, the average efficiency values for the mean and median are about 0.590-0.656, indicating that the average WCM efficiency is about 60%, which needs further improvement.

The mean WCM efficiency scores are higher than the median scores for most companies, indicating that the data is positively skewed. This also shows a more significant number of companies with lower WCM Efficiency, with most having WCM Efficiency scores below about 0.550 (approximately). Furthermore, the mean and median values are stable over the years, indicating minimal improvement in WCM efficiency for manufacturing industries. Therefore, the analysis of the variables associated with the differences in efficiency between companies leads to conclusions for WCM and better performance of companies [33], [34].

Descriptive statistics of other research variables

This section refers to descriptive statistics of the data using indicators such as mean, median, maximum and minimum, and standard deviation. *Table 3* summarizes the status of the descriptive statistics related to the model variables.

Table 3. Descriptive statistics of other research variables.

Variable	Symbol	Average	Median	Max	Min	SD.
Actual accounting performance	True_ Roa	0.1384	0.1146	1.1926	-0.3845	0.1540
Efficiency of working capital	WCM	0.3651	0.3558	0.9612	0.2011	0.1231
Current ratio	Liq	0.6584	0.9614	1.2514	0.3719	1.3614
Fixed assets	PPE	0.5214	0.4975	0.7568	0.3016	0.1254
Company size	Size	14.3861	14.1760	20.1833	11.0338	1.4426
Stock market to book value ratio	MTB	0.8678	0.7808	1.8978	0.3011	0.1936
Financial leverage	Lev	0.5662	0.5723	1.5655	0.1056	0.2158

The results in *Table 3* show that about 56 percent of firms finance their assets with debt. The growth opportunity in firms is about 86 percent. The average amount of fixed assets in companies is 52 percent. The average working capital efficiency is 36 percent.

Test of first research hypothesis

In this section, the research model is fitted to investigate the significant relationship between working capital efficiency and the true performance of companies. The results of estimating the impact coefficients using the fixed effects method for *Table 4* are as follows:

Table 4. Model estimation results with fixed effects.

Independent Variable	Symbol	Beta	Sd. Error	T-Statistic	Sig.	Result
Constant	β	0.2517	0.1024	2.4580	0.000	+
Efficiency of working capital	WCM	0.6548	0.2914	2.2470	0.000	+
Company Size	SIZE	1.3341	0.4268	3.1023	0.000	+
Company growth opportunities	MTB	0.1474	0.0647	2.2782	0.000	+
Leverage ratio	LEV	-0.3719	0.1511	-2.4612	0.000	-
Fixed asset ratio	PPE	0.8754	0.5998	1.4594	0.352	
Current ratio	LIQ	-0.1661	0.2941	-0.5647	0.651	
Adjusted coefficient of determination (R2)		0.71		Durbin-watson		1.9841
F-statistic	11.15411		F-test significance level			0.000

Test of the second research hypothesis

The following hypothesis was tested to determine the nature of the non-linear relationship between working capital efficiency variables and true performance. The results are presented in *Table 5*.

H2: A non-linear relationship exists between working capital efficiency and firm performance.

$$\mathrm{TruP}_{i,t} = \alpha + \beta_1 \mathrm{WCM} + \beta_2 \mathrm{WCME}^2 + \beta_3 \mathrm{MTB}_{i,t} + \beta_4 \mathrm{LEV}_{i,t} + \beta_5 \mathrm{TANG}_{i,t} + \beta_6 \mathrm{LIQ}_{i,t} + \beta_7 \mathrm{SIZE}_{i,t} + \varepsilon_{i,t}$$

Table 5. Model estimation results with fixed effects.

Independent variable	Symbol	Beta	SD. Error	T-statistic	SIG.	Result
Width from origin	β	0.5444	0.1974	2.7578	0.000	+
Efficiency of working capital	WCM	0.8502	0.3514	2.4194	0.000	+
Efficiency of working capital^2	WCM²	-1.3624	0.5001	-2.7242	0.000	-
Company size	SIZE	0.6014	0.2019	2.9787	0.000	+
Company growth opportunities	MTB	0.7496	0.2449	3.0608	0.000	+
Leverage ratio	LEV	-0.9801	0.3997	-2.4520	0.000	-
Fixed asset ratio	PPE	0.6321	0.8400	0.7525	0.5142	
Current ratio	LIQ	-0.5740	0.2997	-1.9152	0.006	
Adjusted R2		0.69		Durbin-Watson		1.8501
F-statistic	12.1514		F- Prob.			0.000

Based on the results of the above table, the nonlinear relationship between working capital efficiency variables and company true performance is nonlinear and inverted U-shaped in *Fig. 2*.

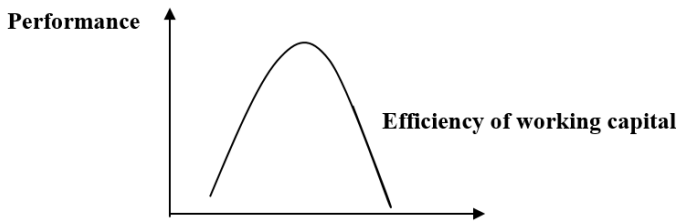

Fig. 2. Relationship between working capital efficiency variables and company true performance.

In other words, working capital efficiency can improve firm performance to an optimal point, but after that, firm performance declines.

Additional test

Retest of the first hypothesis with the alternative dependent variable ROA

The first hypothesis was re-tested between the variables of working capital efficiency and performance with the variable ROA, the results of which are presented in *Table 6*.

Table 6. Model estimation results with fixed effects.

Independent Variable	Symbol	Beta	Sd. Error	T-Statistic	SIG.	Result
Width from origin	β	0.3280	0.1180	2.7796	0.000	+
Efficiency of working capital	WCM	0.8021	0.3599	2.2286	0.000	+
Company size	SIZE	0.6809	0.2671	2.5492	0.000	+
Company growth opportunities	MTB	0.7006	0.2810	2.4932	0.000	+
Leverage Ratio	LEV	1.1512	0.4501	-2.5576	0.000	-
Fixed asset ratio	PPE	0.2103	0.1610	1.3062	0.401	
Current ratio	LIQ	0.4097	0.5133	-0.7981	0.503	
Adjusted R2		0.68		Durbin-watson		1.8002
F-statistic	9.1205		F-Prob.			0.000

The results of *Table 6* show that there is still a positive and significant relationship between working capital efficiency and firm performance (based on the traditional ROA index).

5 | Conclusion

The main objective of this study was to investigate the relationship between WCM efficiency using the DEA approach and the true performance of Iranian manufacturing firms. 1440 company year observations in 6 industries for the period 2006 to 2021 were used for the analysis. In the present study, the DEA input-oriented BCC model was used. This study also used four input and two output variables to calculate WCM efficiency. The study results showed a positive and significant relationship between working capital efficiency, company size, and company growth opportunities with their performance. The results also showed a negative relationship between leverage ratio and performance. The results suggest that managers of business groups can create value for investors by increasing the efficiency of their businesses through a sound working capital policy. WCM ensures that the organization can meet its day-to-day obligations.

Every organization must have at least some investment in working capital to carry out its operations well. Without sufficient working capital, the organization cannot operate or perform. WCM requires a continuous effort to balance the need for current assets and current liabilities. Failure to maintain optimal levels of working capital can disrupt the performance and profitability of companies and lead to company bankruptcy. In Iran, many companies have low investment in their working capital, so it can be expected that the policies and procedures set by management will significantly impact WCM efficiency. According to the research results, the relationship between working capital efficiency and firm performance is non-linear. Further increase of working capital above its optimal level creates a negative trend on profitability, which indicates the disadvantages of working capital financing, namely opportunity cost and high-interest cost.

Research limitations

There are limitations in conducting any research; the present study is no exception. Some of the limitations that should be considered when generalizing the results of the present study are as follows:

I. The first limitation, considered the most important, is semi-experimental research's specificity. In other words, the influence of different variables beyond the control of the researcher and their possibility of influencing the research results cannot be ruled out. Variables such as specific political and economic conditions are examples of variables that may be influential. Therefore, the results of this research should be used in light of these conditions.

II. On the other hand, the limitations imposed on the selection of the statistical sample in this study are within a specific period, and therefore, generalizing the study's results to another period may affect the results.

III. Another limitation is that the data and information provided by these companies may have changed, affecting the results.

Suggestions

According to the research results, investment efficiency increases companies' performance by improving resource allocation. In other words, selecting investment projects with positive net present value leads to improved firm performance and, as a result, increased value for the firm's shareholders. In other words, the average collection period and high inventory level strongly affect the company's profitability. The findings are consistent with the study, which shows that accounts receivable have a strong negative impact on the profitability of GCC companies. The findings of this study can also be supported by the report published by Strategy and PWC, which states that Saudi companies have not traditionally focused on generating cash from operations. As a result, they maintain high levels of inventories and receivables compared to global benchmarks. While some of this is structural due to local procurement practices, the results suggest that the profitability of capital market companies can be significantly improved through effective receivables and inventory management. This study provides researchers with suggestions for conducting new research:

I. Replicate this study using data from other firms at different time intervals.

II. Examine the role of other variables as intervening and mediating variables in the relationship between working capital activities and actual firm performance.

Author Contribution

Seyyed Esmaeil Najafi and Akbar Alem-Tabriz jointly contributed to the conceptualization, methodology, data collection, analysis, and writing of the manuscript. Both authors read and approved the final version of the paper.

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this study.

Data Availability

The data used in this study were obtained from publicly available financial reports of Iranian manufacturing firms. The datasets analyzed in this study are available upon reasonable request.

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