

# The Relationship between Working Capital Management and Investment Efficiency in the Companies Approved by Tehran Stock Exchange

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**Abstract:** Working capital management refers to managing running capitals and debts which is used for balancing the running capitals and debts and is of great importance. Therefore, working capital management is very effective in investment decisions. The purpose of this study is investigating the relationship between working capital management and investment efficiency in companies which are listed by Tehran Securities Exchange from 2011 till 2015. For this end, 136 companies were chosen. The Regression results from the research show that there is a direct and meaningful relationship between working capital management and investment deficiency. So with increasing working capital management, investment deficiency increases accordingly. There is also a direct and meaningful relationship between working capital management and over-investment and under-investment (low investment). Therefore, increasing in working capital management causes excessive investment and lower investment.

**Keywords:** Working Capital Management, Investment Efficiency, Investment Opportunities, More Investment, Low Investment.

## Introduction

The economy world is changing swiftly. Rapid changes of technology with increasing world competition brings heavy burden to the managers' roles. One of the activities for managers, is decision-making. Decision-making is present at every aspects of finance and working investment management. Working investment management comprises optimum combination of current assets with current debts. The managers of profit-making units should choose the best way in different circumstances, according to internal and external factors of profit-making unit with its risks and efficiency, for current assets and current debts. Examination, control and planning about items of working investment, is for choosing the best way in amount of preserving cash in profit-making unit. If working investment management isn't done properly, company may have problems in paying its debts and performing its obligations and may have problem for continuing its functions (Lorgani & Imeni, 2011).

In most companies, the main purpose of management activities is controlling the vital sections and controlling the function of the company and is also hoping for functions of company to progress. One of the main sections that needs special control is current assets and debts section. For that matter, working capital management as a part of financial management domain has great importance. Working capital management is concerned with policies and decisions which is made in working asset in order to change different kinds of current assets and short-term financing resources (Baharmoghadam et al., 2011).

Investing by companies in different fields is usually one of the salient ways for developing the company and preventing economic downturn. Though, limited resources, besides developing investment, causes increasing investment efficiency to be of great importance. Investment efficiency or investing optimally, on the one hand necessitates preventing expending resources on activities with a lot of investment and on the other hand guides resources to activities which need more investment (Hassanzadeh et al., 2014).

Though, the general purpose of this research is examining the effect of relationship between working capital investment and investment efficiency. To precede this research, the following question may stand out: is there a relationship between working capital investment and investment efficiency?

### ***Theoretical foundations***

#### ***Working capital management***

Working capital management is one of the key areas of financial management and enterprise management because it directly affects the liquidity and profitability of companies. There is the possibility of bankruptcy for companies exposed to improper management of working capital, even though there is a positive profitability. Working capital management deals with current assets and liabilities. A significant portion of the total assets is current assets. The excessive levels of current assets can cause less than normal investment proficiency. However, companies that have little current assets, will have deficiencies and problems in the course of their operations (Raheman & Nasr, 2017)

Honi Pong (2010) believes that working capital management includes planning, management of current assets and current liabilities in a manner that prevents the risk of failure and financial ruin in order to prevent the ill-advised short-term obligations and control the over-investment in these assets. Matur (2003) posits two main features for current assets; its short-term life and transforming it into other forms of assets. Through appropriate handling of cash, companies can maximize receivable accounts and inventory and efficiency rate of each unit and minimize the liquidity and business risk. High current asset with each account increases the risk. In general, working capital management means that inventory, receivable account and cash holdings are maintained at a level to be able to pay short-term bills and adequate for current obligations (Rostami et al., 2014). Working capital management includes optimal combination of working capital items as assets and current liabilities, so as to maximize shareholders wealth (Peynou, 2007). Hence, with the effective management of working capital in the companies, shareholders can obtain the maximum returns from their investments (Harford et al., 2008).

Padachi (2006) suggests several reasons that working capital management is essential for the financial health of the business units. First, if the sums invested in working capital compared to total assets of the company, is uneven, it is possible that these funds isn't used in an efficient situation. Efficiency in working capital management is important. In other words, good and orderly management of working capital leads to an increase in the market value of the business unit and can bring substantial results and ignoring it for any company may be dangerous. Second, working capital management directly affects the liquidity and profitability of the business units as well as its net worth. On the other hand, managers expect a proper impact on the company's profitability using working capital management. So for many companies, working capital management is one of the most important issues in financial management.

#### ***Investment deficiency***

Investment efficiency, conceptually means, identification, financing implementation of projects with positive net present value and lack of investment efficiency also means passing through investment opportunities with positive net present value (low investment) or selecting projects with negative net present value (over-investment) (Biddle et al., 2009).

Morgadu & Pindado believe that there is an optimal level of investment that in this level, positive NPV projects are conducted. Companies that are investing higher than this level, are at the over-investment process. In contrast, companies that their investment is less than optimal level, are low investors due to informational asymmetry and high financing costs.

According to Modigliani & Miller, in efficient markets, investment and financing decisions are independent of each other. They believe, the company's investment policy should be determined based on factors that increase profitability, cash flow or net worth. In an efficient market, all projects with positive net present value should be funded. In other words, when managers find an opportunity to invest in projects with positive net present value, they should be able to finance it. So the only factor affecting the company's investment strategy, is the net present value of investment opportunities. But in case of imperfections in capital market such as contractual and informational defects, it is argued that there is a difference between the cost of domestic and foreign financing. In other words, liquidity constraints, asymmetric information and other problems, lead to a reduction in the capacity of co-financing

and have negative influences on the company's investment. So in inefficient markets, financing and investment decisions are not independent of each other (Huiji, 2014). However, limited resources other than developing investment, have caused increasing in the efficiency of investment to be an important matter. In general, investment efficiency, means accepting projects with positive net present value, and investment deficiency means selecting the projects with negative NPV (over-investment) or deselect opportunities for investing (under-investment) (Long et al., 1996). Basically one can seek the problem for conditions such as, over-investment or under-investment in some of the capital market imperfections, such as costs of representation and information asymmetry, in the interaction between shareholders, creditors and managers. This means that not all projects with positive net present value is performed (under-investment) and not the projects with negative net present value is passed (over-investment).

### ***Over and under-investment***

The analysis of investment and familiarity with investment theories can improve management and increase investors' wealth and informed decision-making. The decision on investment faces with three important issues such as expectations, delays and risks that is simply not possible for economists to address them all at the same time. Because according to these problems, many factors affect the level of investment for a firm (Danis et al., 1994).

Company managers, by identifying the factors affecting investment and using them in achieving optimal investment levels, can cause extreme efficiency (Verdi, 2006). Inefficient Markets have defects that can affect optimal level of investment and, ultimately, lead to the process of over and under-investment. over and under-statement states that companies that invest less than optimal level of investment, will suffer from under-investment issue, and companies which invest more than optimal level, suffer from over-investment. Therefore knowing important factors which affects the level of investments has great importance in evaluating, identifying and determining the optimal level of investment of companies. Information Asymmetry, causes several conflicts between stakeholders which leads to over and under-investment. According to over and under-investment, on the one hand, the existence of cash flow due to the asymmetry of information between managers and shareholders, leads to over-investment, and on the other hand, limitations in financing, leads to under-investment.

This study examines the relationship between working capital management and investment efficiency. Some of the research conducted in this field are as follows:

Nadiri (1969) formulated a model for studying the working capital management and cash holdings. Using data from manufacturing companies in America for the fiscal period 1964- 1948, he discovered that the demand for real cash balances is determined by external factors.

On a study which conducted on 478 companies for the period 1982- 1998, Johnson and Soenen (2003) considered 10 indices as an indicator of successful companies that The profitability and liquidity between these indices, is related to working capital.

Bidel et al (2009) examined the relationship between quality of financial reporting and investment efficiency. The results showed that the positive or negative correlation between financial reporting quality and investment are higher in companies which their Operational environment have potential for over and under-investment. The results suggests that a mechanism between financial reporting and investment efficiency can decrease the tensions between these two, which mainly emanates from moral hazard and inappropriate selection and can disorder the investment efficiency. As a result, their findings showed that the quality of financial reporting is related to over and under-investment.

Zhao (2011) through interview with 10 companies and a survey for 120 large companies in Australia, explored the approaches used by managers in the management of cash, receivable and payable accounts and risk management. The findings show that key factors such as size and performance of the company, credit ranking, industry, education, gender and the amount of working capital plays a vital role in management and a major share of management changes is related to behavioral aspects in the working capital management. Results also show that in Australia talented managers tend to behavioral biases such as loss-aversion, Overconfidence and reinsurance, that some of these cases may be desirable for efficiency.

Abuzayed (2014) explored working capital management and performance of firms in emerging markets in Jordan. In this study, he analyzed data from years 2000 to 2008. The cash conversion cycle and its components, as skills in working capital management, were considered. This study showed that positive profitability, is after the cash conversion cycle, and less profitable firms have greater incentive to manage their working capital.

Iqbal & Ali Butt (2015) examined the relationship between loss aversion, overconfidence, self-serving and effectiveness of reinsurance with working capital management in Pakistan. The results show significant correlation between behavioral bias and working capital management.

Guariglia and Yang (2016) studied the impact of financial constraints and agency costs on investment efficiency. Results showed that companies with free cash flow of more than optimal levels are more likely to over-

invest, and the reason for this, is agencies cost and companies that have lower free cash flow tend to under-estimate because of financial constraints.

**Research hypotheses/ questions**

In order to achieve the research goals, the following hypotheses have been developed:

1. There is a meaningful relationship between the management of working capital and inefficiency of investment.
2. There is a meaningful relationship between working capital management and investment.
3. There is a meaningful relationship between working capital management and under-investment.

**Materials and Methods**

**Statistical population and sampling method**

A statistical society is a collection of individuals or units that have at least one common trait. Typically, in each research, the community under study is a statistical society that the researcher is willing to study about the adjectives or variable attributes of their units. The definition of the statistical community should be comprehensive and preventable. In other words, this definition should be stated so that from a temporal and spatial point of view, all the studied units are included and, at the same time, prevented from including units that should not be studied (Sarmad et al., 2005).

In this research, a systematic elimination method is used to determine the statistical sample of an appropriate representative of the statistical population. For this purpose, five criteria are considered below and if the company has all the criteria, then the sample of the research will be selected and the rest will be deleted.

1. The company is admitted to the exchange before the year 2011 and will be active on the exchange until the end of 2015.
2. Due to the specific nature of the holding companies, financial intermediaries and investment companies, and the significant difference with the manufacturing and trading companies, the company is not the sole target group.
3. In terms of increasing the comparability, the fiscal year of the company will be March 29th and will not change the fiscal year or change of activity during the study period.
4. The company has no trading interruption for more than 6 months.
5. The financial information required for conducting the research has been thoroughly presented during 2011-2015.

According to the above limitations, among all listed companies, 136 companies remained. As a result, all of these companies were examined and no sampling was done.

To test the research hypotheses, the regression models will be used as follows:

$$\begin{aligned}
 I_{i,t} &= \alpha_0 + \beta_1 CCC_{i,t} + \beta_2 OCF_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 LEV_{i,t} + \epsilon_{i,t} \\
 OverI_{i,t} &= \alpha_0 + \beta_1 CCC_{i,t} + \beta_2 OCF_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 LEV_{i,t} + \epsilon_{i,t} \\
 UnderI_{i,t} &= \alpha_0 + \beta_1 CCC_{i,t} + \beta_2 OCF_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 LEV_{i,t} + \epsilon_{i,t}
 \end{aligned}$$

In the above models:

- $I_{i,t}$ : Income inefficiency of company  $i$  in year  $t$ ;
- $OverI_{i,t}$ : over-investment of company  $i$  in year  $t$ ;
- $UnderI_{i,t}$ : under investment of company  $i$  in year  $t$ ;
- $CCC_{i,t}$ : Index of Corporate Working Capital Management in year  $t$ ;
- $OCF_{i,t}$ : Operating cash flow of company  $i$  in year  $t$ ;
- $SIZE_{i,t}$ : size of company  $i$  in year  $t$ ;
- $LEV_{i,t}$ : financial leverage of company  $i$  in year  $t$ ;
- $\epsilon$ : Model errors.

In this research, working capital management will be considered as an independent variable and investment efficiency as a dependent variable. Also, from financial leverage variables, company size, return on assets and operating cash flow will also be used as a control variable. To examine the management of capital management, the cash-flow cycle is used.

**Research variables**

**Independent variable**

The independent variable of this study is the management of working capital. To examine working capital management, the cash-flow cycle is used, which is described below.

### **Cash Conversion Cycle**

To measure working capital management, the criterion of the conversion cycle is usually used. The cash flow cycle is the number of days when the resources of the company are invested in business operations. This criterion is the most commonly used index for managing working capital (Vaez et al., 2014). The cash-flow cycle refers to the time interval between the payment for the purchase of inventory for use in the production process and the receipt of cash from the sale of the final product. The longer it takes, the more investment in working capital is needed. The longer-term cash cycle may increase the company's profitability, which leads to higher sales. However, with the increasing length of the conversion cycle, the profitability of the company may be reduced. This occurs when the cost of increasing investment in working capital is greater than the benefits of maintaining more inventory or giving more credit to customers (Deloof, 2003). Decisions about receivables and inventories and the amount of credit received from suppliers are reflected in the company's cash cycle (Troll & Solano, 2007).

The cash flow cycle consists of the variables of the receivables collection period, the inventory conversion period, and the payout period, which is established between the variables listed below:

Debt Settlement Period (Receivables Period + Conversion of Goods Inventory) = Cash Conversion Cycle (CCC).

### **Duration of Receivables**

The period for collecting receipts for the profitability of a unit in the receipt of funds related to sales of goods, as well as the company's credit policies, is the time interval between the sale of goods in a way to cash inflows for sales; The larger this variable is, the greater is investment in accounts receivable (Poorheidari et al., 2011). This variable is calculated by the following equation. Due to the lack of separation of this information in the stock exchange, total sales will be used.

$$\text{Account Receipt Period} = 365 \times \frac{\text{average received accounts}}{\text{sale}} \quad \text{equation 1}$$

### **Conversion period of goods inventory**

Having an optimal level of inventory and applying appropriate controls on inventories is possible by reducing maintenance costs and investing in inventory. Therefore, delivery and delivery of goods to customers in a timely manner, as well as reducing the cost of inventory of goods, is one of the challenges faced by managers, which is being addressed by appropriate measures. The inventory conversion period indicates the average number of days the inventory is stored by the entity. The larger value of this variable indicates more investment in inventory for a certain level of operations (Poorheidari et al., 2011). The conversion period for inventory is obtained through the following equation:

$$\text{Conversion period of Goods inventory} = 365 \times \frac{\text{average inventory}}{\text{finish price of sold goods}} \quad \text{equation 2}$$

- Period of payment of payable accounts

It means the average number of days it takes for the company to pay the necessary funds to the suppliers and creditors (Vaez et al., 2014: 1393). The payout period is paid through the following equation:

$$\text{Period of payment of payable accounts} = 365 \times \frac{\text{the average payable accounts}}{\text{finish price of sold goods}} \quad \text{equation 3}$$

In this study, the Cash Conversion Cycle formula (CCC) will be used to measure working capital management. Using the Cash Conversion Cycle to calculate working capital is a common concern among domestic and foreign researchers. For example, Raheman and Nasr (2007), Taleb et al (2010), Ugandip et al (2012), Praise and Associates (2008), Yaghoub Nejad et al (2010), Spring et al (2011), Vaez et al (2014) and many other domestic and foreign researchers have used this method.

### **Dependent variable**

In this research, the investment inefficiency variable is considered as a dependent variable.

### **Inefficiency of investment**

In a research conducted by Tehrani and Hesarzadeh (2009), to find suitable variables as a criterion of growth opportunities that can explain corporate investment in Iran, over 30 patterns (including patterns used by Biddle and Hilary, 2006; Verdi 2006; Biddle et al., 2009) have been tested to calculate investment efficiency, according to their findings, none of these patterns could provide a good opportunity for corporate investment in Iran. Therefore, in the

present research, the following pattern is used by Tehrani and Hesarzadeh (2009), which has been used by Saghafi and Motamedi Fazel (2011) and Namazi and Gholami (2014).

$$I_{i,t} = \beta_0 + \beta_1 \text{CFO}_{i,t-1} / \text{TA}_{i,t-1} + \beta_2 \text{MTB}_{i,t} + \beta_3 \Delta \text{Si}_{i,t-1} + \beta_4 \text{ROA}_{i,t-1} + \beta_5 \text{OP}_{i,t} / \text{TA}_{i,t-1} + \epsilon_{i,t}$$

Where:

$I_{i,t}$ : Company  $i$  investment in year  $t$ , measured by the ratio of changes in total assets;

$\text{CFO}_{i,t-1}$ : Operating cash flow of company  $i$  in year  $t-1$ ;

$\text{MTB}_{i,t}$ : the ratio of the market value to the firm's book value at the end of year  $t$ , which is measured based on the

Total book value of the total debt plus the market value of equity divided by the total book value of the assets;

$\Delta \text{Si}_{i,t-1}$ : sales volatility of company  $i$  in year  $t-1$ ;

$\text{ROA}_{i,t-1}$ : Return on assets  $i$  is measured in year  $t-1$  based on net profit and loss divided by total assets;

$\text{OP}_{i,t}$ : Operating profit and loss in year  $t$ ;

$\text{TA}_{i,t-1}$ : Total assets of company  $i$  in year  $t-1$ .

$\epsilon_{i,t}$ : The values of the errors resulting from the fit of regression that indicate the inefficiency of the investment. These values may be either positive or negative. Positive values (positive deviations from expected investments) indicate the selection of projects with a negative net present value, or more investment and negative values (negative deviations from expected investments), representing the passage of valuable investment opportunities with positive net present value, that is under-investment.

### **Control Variables**

In this research, two variables of company size and financial leverage are considered as control variables.

#### **Company size**

Different indices and different researches have been used to determine the size of a company. Kroes and Manikas (2014) from Margaritam Sales, Al-Najjar (2013) from Margaret of Assets, and Chan et al. (2012) used Margaret of the stock market value. In domestic research, Aligholi and Jalilian (2011) used the stock market value logarithm; Fakhari and Yousefnejad (2006) the average total assets logarithm; Yagoub Nejad et al. (2010), selling logarithm and Heydarpur and Khwaja Mahmood (2014) used total assets logarithm. In this research, the stock market value of the company is used as size.

#### **Financial leverage**

The financial leverage reflects the amount of resources generated by the use of other people's capital. With a greater magnitude of the financial leverage, the degree of financial risk (profitability fluctuation) will be higher, because the higher the leverage, with a slight change in the amount of profit before the fixed costs, the profits of each share will change dramatically (Bozorgasl, 2016). Following is how to calculate the financial leverage:

$$\text{LEV}_{i,t} = \text{TL}_{i,t} / \text{TA}_{i,t}$$

Where:

$\text{LEV}_{i,t}$ : financial leverage of company  $i$  in year  $t$ ;

$\text{TL}_{i,t}$ : total debt of company  $i$  in year  $t$ ;

$\text{TA}$ : Total assets of company  $i$  in year  $t$ .

Operational cash flow: According to the findings of the research, Nazemi and Gholami (1393), operational cash flow has a positive and significant relationship with the efficiency of investment.

## **Materials and Methods**

This research, based on its purpose, is applied research. Applied research is a research that applies theories, rules, principles, and techniques to solve real and actual problems. Also, the present study is descriptive in terms of categorization according to the method. The research method is of descriptive research type, correlation type, in which the relationship between several variables is investigated. The research project is quasi-experimental and uses The Posttest Only Design (using past information). A post-event research is used when the researcher examines the subject after the occurrence of the events and the data is collected from a natural environment without direct intervention.

**Results**

To analyze the data, the descriptive statistics of the data under study are calculated. Table (1) shows descriptive statistics of sample companies. The descriptive statistics table indicates the mean, minimum, maximum and standard deviation of each of the independent and dependent variables. In this table, the main central indicator is the mean, which represents the equilibrium point and the distribution center, and is a good indicator of the center of the data. For example, the average investment inefficiency (dependent variable) is 0.0298. Also, the average of working capital variables (independent variable) is 241.662.

**Table 1.** Descriptive statistics of research variables.

Variable	Mean	medium	Maximum	minimum	SD
Investment inefficiency	0.0298	-0.0197	3.598	-0.641	0.219
working capital	241.662	218.904	7.459	-231.445	149.228
company size	13.820	13.751	18.705	9.255	1.352
Financial leverage	0.626	0.642	0.99	0.09	0.178
Operating cash flow	0.228	0.173	9.468	-0.677	0.485

As can be seen in the table above, the dependent variable of the research is the inefficiency of the investment. In this study, the value of investment model errors as a direct indicator of inefficiency of investment is used. Using the regression of the combined data of year-corporation, we obtain the coefficients and the significant level of each of the variables (the description of this section is given in the appendix), and then through the multiplication of the coefficients of the variables that are meaningful in the actual values of the variables of year - The target company, the optimal level of investment (investment efficiency) of that year is obtained by the company. Finally, the inefficiency of each year's investment comes from the difference between investment and the optimal level of investment. This ineffectiveness may come in two forms of investment in more than optimal level (over investment) or investment below the optimal (low investment) level. Accordingly, the results showed that the under investigation companies faced with average and positive values of the waste resulting from the fitting of the model or in other words, the selection of projects with negative net present value or over investment which is about 2.14% .

Regarding the control variables, in the companies which were investigated, the size of the company is about 13.82 unit. Also, the financial leverage of the companies surveyed averaged 62.6% of assets, which represents the major share of debt in the financing structure of sample firms.

In the descriptive statistics concerning the distribution of variables, the standard deviation of the data shows the distribution of data from the mean. Among the variables, the financial leverage variable has the least dispersion of the average, and the frequency of receivable accounts variable has the most dispersion from the mean.

**Testing the first hypothesis**

The main purpose of the first hypothesis test is to investigate whether there is a meaningful relationship between working capital management and investment inefficiency or not. And its statistical hypothesis is expressed as follows:

**Table 2.** Pattern selection results for the estimation of the first hypothesis model.

Exam type	The statistics	amount	level of Meaningfulness
Chow test	F test	4.259	0.0000
Hausman Effectiveness Test	Chi square	56.761	0.0000

As can be seen in the table above, based on the F test statistics and its probability, the use of the hybrid model (probability of a statistic less than 5% error rate) is appropriate. Then the model selection test of the constant or randomized effects was carried out. In this model, based on the chi square statistic, it is appropriate to use a model with fixed effects (probability of a statistic less than 5% error rate).

The results of the model estimation as well as the results of the classical regression statistics and assumptions are presented in Table (3).

**Table 3.** Test results of First test hypothesis.

Dependent variable: Inefficiency of investment					
Method: Least Generalized Squares with Fixed Effects					
variables	Signs	Coefficients	Standard error	T-level	Sign.
Width from origin	C	2.476	0.642	3.856	0.0001
Working capital	CCC	3.684	0.286	12.844	0.0000
Operating cash flow	OCF	-0.258	0.131	-1.967	0.0493
Company size	SIZE	0.071	0.032	2.225	0.0262
Financial leverage	LEV	1.468	0.310	4.729	0.0000
F Fisher statistics		27.425	Likelihood of FF statistics		0.0000
Adjustable coefficient		0.463	Durbin-Watson model		1.6120

As can be seen in the above table, the F Fisher model and its probability (less than the error level of 5%) show a total meaningfulness of regression model. As a result, there is a meaningful linear relationships in the model, and we can deduce the correctness of the predictability of investment inefficiency based on the explanatory variables of the model. The modified coefficient indicated that the model variables in total had the ability to explain about 46.3% of the inefficiency of the investment. The Durbin-Watson model (between 1.5 to 2.5) showed that there is no correlation between the model errors and the model is in good condition. In fact, model errors are independent.

According to the results of model estimation in Table (3), the meaningfulness level of working capital variable is equal to (0.0000) and less than the error level (0.05), and the coefficient of this variable is (3.168) As a result, this hypothesis is approved. In fact, there is a positive and significant relationship between the variable of working capital and inefficiency of investment.

**Testing the second hypothesis**

The main purpose of the second hypothesis test is to investigate whether there is a meaningful relationship between working capital management and over-investment or not. And the statistical hypothesis is expressed as follows:

H1: There is a meaningful relationship between working capital management and over investment. First, the results of the model's predecessors are presented in Table 4 for choosing the suitable fitting method for the regression model of the combined data.

**Table 4.** Results of model selection for estimating the model of the second main hypothesis.

Test type	statistic	amount	Level of meaningfulness
Chow test	F test	1.625	0.008
Hausman Effectiveness Test	Chi square test	6.012	0.367

As can be seen in the table above, based on the F test statistics and its probability, the use of the hybrid model (probability of a statistic less than 5% error rate) is appropriate. Then the model selection test of the constant effect or randomization was carried out. In this model, based on the Chi square statistic, it is appropriate to use a model with random effects (the probability of a statistic exceeding the 5% error rate).

The results of the model estimation as well as the results of classical regression statistics and assumptions are presented in Table (5).

**Table 5.** Test results of the second main hypothesis.

Dependent variable: over-investment					
Method: Least Generalized Squares with Fixed Effects					
variables	Signs	Coefficients	Standard error	T-level	Sign.
Width from origin	C	2.523	0.794	3.177	0.0027
Working capital	CCC	1.881	0.386	4.873	0.0000
Operating cash flow	OCF	-0.0004	0.005	-0.081	0.0475
Company size	SIZE	0.121	0.058	2.086	0.0456
Financial leverage	LEV	1.131	0.468	2.417	0.0243
F Fisher statistics		5.685	Likelihood of FF statistics		0.0002
Adjustable coefficient		0.326	Durbin-watson statistics		1.842



As can be seen in the above table, the F Fisher model and its probability (less than the error level of 5%) show a total meaningfulness of regression model. As a result, there is a meaningful linear relationship in the model, and we can deduce the correctness of the predictability of investment over the explanatory variables of the model. The modified coefficient of determination showed that the model variables in total have the ability to explain about 32.6% of the change in over-investment. The statistic of Durbin-Watson model (between 1.5 to 2.5) showed that there is no correlation between the model's errors and the model is in good condition. In fact, model errors are independent.

According to the results of model estimation in table (5), the meaningfulness level of working capital variables is equal to (0.0000) and less than the error level (0.05), and the coefficient of this variable is (1.881) As a result, this hypothesis is approved. In fact, there is a positive and significant relationship between the variable of working capital and over investment.

**Testing the third hypothesis**

The purpose of the main hypothesis test is to investigate whether there is a meaningful relationship between management of working capital and under-investment or not. And the statistical hypothesis is expressed as follows: H1: There is a meaningful relationship between working capital management and under-investment. First, the results of the model's pre-fitting are presented in Table 6 for choosing the appropriate fitting method for the regression model of the combined data.

**Table 6.** Pattern selection results for estimating the main third hypothesis model.

Test type	statistic	amount	Level of meaningfulness
Chow combining test	F test	12.894	0.0000
Hausman's Effectiveness Test	Chi square	7.236	0.198

As can be seen in the above table, based on the F test statistics, and the likelihood of using the hybrid model (probability of a statistic less than 5% error rate) is appropriate. Then the test of constant or random effects model selection was carried out. In this model, based on the chi square statistic, it is appropriate to use the model with random effects (the probability of a higher error rate than 5% error rate).

The results of the model estimation as well as the results of the classical regression statistics and assumptions are presented in Table (7).

**Table 7.** Test results of the main third hypothesis.

Dependent variable: under-investment					
Method: Least Generalized Squares with Fixed Effects					
variables	signs	Coefficients	Standard error	T-level	Sign.
Width from origin	C	2.242	0.612	3.657	0.002
Working capital	CCC	2.654	0.569	4.664	0.0000
Operating cash flow	OCF	-0.0003	0.004	-0.075	0.0423
Company size	SIZE	0.122	0.058	2.103	0.0295
Financial leverage	LEV	0.449	0.115	3.904	0.0001
F Fisher statistics		5.358	Likelihood of FF statistics		0.0000
Adjustable coefficient		0.316	Durbin-Watson statistics		1.857

As can be seen in the above table, the F Fisher model and its probability (less than the error level of 5%) shows a total meaningfulness of the regression model. As a result, there is a meaningful linear relationship in the model, and we can deduce the correctness of the predictive capability of the under-investment based on the explanatory variables of the model. The modified coefficient of determination showed that the variables of the model in total have the ability to explain about 31.6% of the low investment variation. The Durbin-Watson model statistic (between 1.5 to 2.5) showed that there is no correlation between the model's errors and the model is in good condition. In fact, model errors are independent.

According to the results obtained from the model estimation in Table (7), the meaningfulness level of working capital variables is equal to (0.0000) and less than the error level (0.05), and the coefficient of this variable is (2.654)

As a result, this hypothesis is approved. In fact, there is a positive and significant relationship between the variable of working capital and low investment.

### **Conclusion**

Working capital management in a company's management structure plays a vital role. Active capital management is an essential requirement for an organization to adapt to a challenging economy, and aims to establish a critical balance between maintaining liquidity to support day-to-day operations and maximizing the use of short-term investment opportunities. In inefficient markets, financing and investment decisions are not independent of each other. In general, investment efficiency means accepting projects with a positive net present value, and by investment inefficiency, we mean choosing projects with negative net present value (over-investment) or not selecting investment opportunities (low investment). Essentially, one can look for the root of the emergence of conditions such as over investment or low investment in some of the capital market imperfections, such as agency costs and information asymmetries stemming from interactions between shareholders, creditors and managers. In the sense that not all projects are carried out with a purely positive net present value (low investment) and not the negative net present value projects are rejected (over investment). Capital management has a positive relationship with inefficiency in investing. That is, the greater the management of capital in a company, the inefficiency of investment will increase. Also, with an increase in the management of working capital, over-investment will increase. Companies with a lower flow of free cash tend to low-investing, due to financial constraints. On the other hand, the greater the management of working capital in the company, the more the low investment.

### **Further suggestions**

1- Because capital management is directly related to the inefficiency of investing, corporate executives pay more attention to the management of capital efficiency, since inefficiencies in managing capital flows can lead to inefficient investment decisions. And has an adverse effect on company performance.

2- Companies form a committee to review and make economic decisions to keep to the optimum level of working capital because paying attention to the working capital investment sector is of great importance to the companies.

3- The effect of internal and external organizational oversight mechanisms on the efficiency of investment decisions should be considered.

### **Conflict of interest**

The authors declare no conflict of interest

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