

## Measuring Excess Cash Balance and Studying its Relationship with Stock Return in Companies Accepted in Tehran Stock Exchange

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### Abstract

Goal of cash management is to limit cash levels in the company and maximize stock return. Cash should be kept at a level which makes balance between cash holding cost and insufficient cash cost. The present research studied the relationship between characteristics of companies and their cash holding. Excess cash amount was measured using regression model and its relationship with stock return of companies was analyzed. Statistical population included the companies accepted in Tehran Stock Exchange from 2006 to 2011 and the statistical sample was 151 companies which were selected from among them. The research results indicated that companies with higher ratio of market value to book value and larger size held less cash reserves. It seems that the mentioned specification played a role in determining cash holding policies of companies and potentially prevented from cash accumulation in them. Also, the companies which earned cash flow resulting from higher operations had higher cash balance and excess cash holding reduced stock return of the companies; as a result, investors show undesirable reaction to excess cash.

### Key words

Operating cash flow, operating capital, excess cash, stock return

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### 1. Introduction

Companies determine their optimal cash level by keeping a balance between benefits and cash holding costs. In fact, companies adjust their optimal cash level by determining importance of final costs and final benefits resulting from cash holding. The important point is that there is a desirable cash level for companies, at which management makes decision about cash holding in an active approach based on cost-benefit analysis. Manner of applying internal funds is an important decision in conflict between shareholders and managers. During economic growth of companies, with increase of cash reserves, managers decide on distributing it among shareholders, spending it for internal expenses, applying for external acquisition or still holding it. The choice of profit-seeking managers between using and holding cash reserves is an ambiguous issue. Managers should compare current personal benefits with flexibility which is obtained by holding cash reserves. In addition, profit-seeking managers should measure probability of cost-benefit constraint resulting from high cash holding (Harford *et al.*, 2008, Ferreira, M. A., and A. Vilela, 2004). What should be considered is that explanation of these conditions in stock companies can be based on agency theory and costs imposed on owners of these companies, which mainly results from profit-seeking incentives of managers.

Excess cash balance is the cash in excess of the amount which is required for projects with positive net present value. In other words, it is desirable for a profit unit to hold cash only at a level which can be utilized in investment opportunities of projects with positive net present value. These funds are important because they allow companies to seek opportunities which increase value of shareholders (Ferreira, M. A., and A. Vilela, 2004). It is not possible to develop new products, perform commercial acquisitions, pay cash profits to shareholders and reduce liabilities. On the other hand, cash should be held at a level which could

balance cash holding cost and insufficient cash cost (Garcia-Teruel, P.J.P. Martinez-Solano, J. P. Sanchez-Ballesta, 2008).

It is important to note that low cash balance by itself does not indicate an undesirable condition. If cash of a company is less than the acceptable level, it can demonstrate high investment of the company, which is natural in many newly-established companies. If the conducted investments are followed by high return, the mentioned strategy will have the potential of obtaining desirable result in a long run (Opler Tim, Pinkowitz Lee, Stulz Reneh, Williamson Rohan, 1999).

Lee E., Powell R. (2010) found some evidence showing that capital market reacts to cash holding level in stock companies. They were also informed that the companies which constantly held excess cash had less return for their shareholders compared with those which faced this issue randomly and periodically. Main goal of the present research was to pay attention to the factors which determine cash holding level in companies. Consequences resulting from excess cash holding were also considered.

## 2. Research background

Han, S. and Qiu J. (2006) showed that companies with financial limitations increased their cash holding in response to increased cash flow fluctuations because financial limitations created a kind of competition and conflict between current and future investments and, despite the risk of future cash flows, generated motivation for taking measure about precautionary savings.

Guney, Y., Ozkan, A. and Ozkan N. (2007) studied cash holding behavior in French, German, Japanese, English and American companies using data from 4069 companies during 1996 to 2000. This research focused on the relationship between lever and cash holding and its evidence indicated a significantly nonlinear relationship between cash holding and lever. Results of this research also showed that effect of lever on cash holding somehow depended on characteristics of countries such as ownership concentration.

Harford, J., Mansi, S.A. and Maxwell. W.F. (2008) analyzed the relationship between factors of corporate governance and cash holding in the USA. Results of this research showed that companies with weak strategic governance structures had lower cash reserves and companies with low equity and excess cash had less profitability.

Garcia *et al.* (2008) studied effect of accruals quality on cash of the company using a sample consisting of stock companies in Spain from 1995 to 2001 and showed that companies with high accruals quality held less cash than those with low accruals quality.

Ramirez. A., Tadesse S. (2009) investigated the relationship between uncertainty avoidance, multinationality and cash holding of companies. Evidence of this research confirmed the presented hypotheses so that companies tended to hold more cash in countries with high avoidance level. According to results of this research, multinationality of companies was also in a direct relationship with cash holding level.

Lee and Powell (2010) studied corporate cash holding policies and their effect on wealth of shareholders. Their results showed sectional model as the best pattern for explaining desirable cash level. They also concluded that instability of excess cash holding increased stock risk more than the case in which the company had stable excess cash. Moreover, the results indicated that final desirability of cash decreased with increase of its balance; however, older companies tended to hold more cash balance.

Sun et al. (2012) in a research entitled the relationship between profit quality and corporate cash holding showed that low earning quality had a negative effect on the held cash value while higher profit quality increased tendency of managers of profit units to hold cash. Results of this research demonstrated that low profit quality neutralized positive effects of increased cash reserves on market value of the company or reduced its intensity.

Al-Najjar (2012) studied financial determinants of cash holding in developing countries and compared them with developed countries. In this research, effect of capital structure and profit division policy on cash holding was studied in Brazil, Russia, India and China and these effects were compared with American and English cases. The results showed that factors of capital structure, profit division policy and company size were effective in cash holding and these findings were similar in developing and developed countries. According to the findings, companies held more cash in countries with low protection from shareholders.

Fakhari and Taghavi (2009) studied effect of accruals quality on cash balance of companies by selecting a sample of 150 companies in time period of 2002 to 2006. In this research, accruals quality was measured using Dichev and Dechow's model. The results showed that accruals quality had a significantly negative relationship with cash balance; i.e. accruals quality as a factor affecting cash was important and relevant.

Rasaeian *et al.* (2010) conducted a research on the relationship between supervisory mechanisms of corporate governance and cash holding level of companies. Main goal of their research was to study the relationship between some corporate governance mechanisms including percent of non-obliged members of the board of directors and percent of institutional investors as independent variables and cash holding level as the dependent variable in Tehran Stock Exchange. They studied 129 companies in a 10-year period from 1999 to 2009. Results of the research indicated a significantly negative relationship between percent of non-obliged members of board of directors and cash holding level in Tehran Stock Exchange; but, there was no significant relationship between percent of institutional investors and cash holding level.

Foroghi *et al.* (2011) investigated the relationship between profit quality (independent variable) and cash holding rate (dependent variable) in Tehran Stock Exchange. Other control variables which were used in the present research included growth opportunities, size of company, structure of liabilities maturity, relation with financial institutes, capital opportunity cost invested in cash assets, company lever, other cash assets, production capacity of cash flows, profit division percent, ratio of investment in fixed assets to fixed net assets of the first of period, the number of years the company has continued its activities and membership in commercial group. In this regard, 10-year (2000-2009) information of 150 companies was examined. To test the hypotheses, multivariate regression was used with panel data. The results showed a significantly negative relationship between profit quality and cash holding rate in Tehran Stock Exchange. Generally, results of this research demonstrated that almost 85% of changes in cash holding level of companies accepted in Tehran Stock Exchange were explained by changes of the variables used in the research model.

### 3. Research hypotheses

The research hypotheses included:

*First hypothesis:* There is a significant relationship between company's ratio of market value to book value and cash balance.

*Second hypothesis:* There is a significant relationship between size of company and cash balance.

*Third hypothesis:* There is a significant relationship between financial lever of a company and cash balance

*Fourth hypothesis:* There is a significant relationship between operating cash flow of the company and cash balance.

*Fifth hypothesis:* There is a significant relationship between operating capital of the company and cash balance.

*Sixth hypothesis:* There is a significant relationship between excess cash holding of the company and cash balance.

### 4. Research methodology

In this research, a regression model was used for measuring desirable cash balance at company level. This regression model was designed and tested following the research by Opler *et al.* (1999) and Lee and Powell (2010), in which liquidity of a company was regarded as a function of variables affecting cash holding. After calculating desirable and expected cash level, the obtained values were compared with actual cash balance and excess cash level was obtained (Lee and Powell (2010)). This pattern was as follows:

$$LIQ_{i,t} = \beta_0 + \beta_1 MTB_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 LEV_{i,t} + \beta_4 OCF_{i,t} + \beta_5 NWC_{i,t} + \beta_6 \Delta INV_{i,t} + \beta_7 FIN_{i,t} + \beta_8 \Delta CF_{i,t} + \varepsilon_{i,t} \quad (1)$$

Where:

LIQ: liquidity of company (cash balance divided by total assets, except cash balance)

MTB: growth opportunities of company (ratio of capital market value to capital book value)

SIZ: size of company (normal logarithm of total assets)

LEV: financial lever degree (ratio of total liabilities to total assets)

OCF: operating cash flow divided by total assets

NWC: net operating capital divided by total assets

$\Delta INV$ : change in long-term investments (difference of long-term investment balance of period t from long-term investment balance of period t-1)

FIN: net financing of company (difference between balance of long-term receivable facilities in period t and balance of long-term receivable facilities in t-1 period)

$\Delta CFI$ : change in net cash flow (net difference between cash flow in period t and that of period t-1)

After fitting the above regression model, prediction values of the model showed a desirable level of cash balance for each company in the considered period, which was marked by symbol BLIQ. In other words, necessary cash of the company was a function of independent variables of the above model. To calculate excess cash, the following formula was used for each company in the studied statistical sample (Lee and Powell, 2010).

$$XLIQ_{i,t} = ALIQ_{i,t} - (BLIQ_{i,t} + 1.5\delta_{ti}) \quad (2)$$

Where:

XLIQ: excess cash

ALIQ : actual cash balance

BLIQ: desirable cash balance

$\delta$ : standard deviation of regression model of cash holding

### **Dependent variable(s)**

Dependent variable of the first to fifth hypotheses was cash balance of companies and dependent variable of the sixth hypothesis was total return of stock during a financial year. Each of these variables was as follows:

$$1. \text{ Cash balance} \quad CASH_{it} = \frac{Cash_{it}}{Total\ Assets_{it}} \quad (3)$$

$$2. \text{ Total stock return} \quad R_{i,t} = \frac{(P_{i,t} - P_{i,t-1}) + D_{i,t}}{P_{i,t-1}} \quad (4)$$

Where

P: mean market price of shares of a company during the period

D: benefits distribution of shares ownership including cash profit, priority, bonus shares etc.

### **Independent variable(s)**

Independent variables of the first to fifth hypotheses included factors affecting cash holding level and independent variable of the sixth hypothesis was excess cash of the statistically sampled companies, which were calculated as follows:

#### **1. Ratio of market value to book value**

This ratio reflects growth opportunities of companies and some researchers such as Ozkan A. and N. Ozkan (2004) and Pinkowitz, L. and R. Williamson (2007) have considered it as a factor which determines cash of companies. This ratio was obtained by dividing market value of company share by book value of equity and was independent variable of the first hypothesis.

$$MTB_{i,t} = \frac{Market\ Value_{i,t}}{Book\ Value_{i,t}} \quad (5)$$

## 2. Size of company

Company size is one of the criteria reflecting characteristics of companies. Dittmar, A., J. Mahrt-Smith and H. Servaes (2003) proposed that larger companies held more cash reserves due to higher volume of operating activities. In this research, company size was independent variable of the second hypothesis and book value logarithm of total assets was used for its measurement.

$$MTB_{i,t} = \frac{\text{Market Value } i,t}{\text{Book Value } i,t} \quad (6)$$
$$Size_{i,t} = \ln(\text{Assets}_{i,t})$$

## 3. Financial lever

Financial lever reflects financial and credit policies of companies which shows its application level of financial facilities. Harford, J., S. Mansi and W. Maxwell (2008) believed that the companies which could access resources outside the company with low expense did not tend to hold cash reserves because they could easily finance their new projects using external financial resources. This criterion is an index for financial risk of companies and capability of paying liabilities and was independent variable of the third hypothesis.

$$Lev_{i,t} = \frac{\text{Total Liabilities}}{\text{Total Assets}} \quad (7)$$

## 4. Operating cash flow

Cash flows of a company are a criterion for its ability to create financial resources and liquidity of the company. Harford et al. (2008) showed that companies with higher fluctuations in cash flows held more cash, through which they reduced risk of losing investment opportunities in projects with positive net present value.

$$CFO_{i,t} = \frac{\text{Operating Cash Flow}}{\text{Total Assets}} \quad (8)$$

## 5. Operating capital

In many studies, operating capital has been recognized as a criterion for financial policies of companies in terms of cash (for example, Opler *et al.*, 1999, and Faulkender, M. and R. Wang, 2006). Speed of converting goods into liquidity and collecting claims from functions of operating capital are regarded in corporations and have a direct effect on cash reserves. Therefore, it seems that there is a significant relationship between this variable and cash balance. Operating capital is obtained from the difference between current assets and current liabilities; it has been also scaled through dividing other variables by book value of assets and was independent variable of the fifth hypothesis.

$$NWC_{i,t} = \frac{\text{Current Asset} - \text{Current Liabilities}}{\text{Total Assets}} \quad (9)$$

## 6. Measurement method of the held excess cash

### Information collection method

Considering nature of this research, library method was used for collecting the required information. In this method, first, library sources including books, magazines, theses, articles and the Internet are used to conduct pilot studies and formulate chapter of literature and theoretical framework. Then, using databases of Tehran Stock Exchange, website of this organization and shares software such as Rahavard Novin software, the data required for testing the hypotheses were collected for six consecutive years (from 2006 to 2011) as the research period.

*Studied statistical sample and population*

In the present research, classified and audited financial data of manufacturing companies accepted in Tehran Stock Exchange were used to test the research hypotheses. To select a suitable statistical sample, systematic elimination sampling method was used. Table 1 shows how to select and extract suitable statistical sample of the research considering sampling methods, mentioned considerations and conditions and the data available in the stock.

*Table 1. Selection and extraction of the sample*

The number of companies attending stock exchange from 2006 to 2011	294 companies
The number of companies attending stock exchange from 2006 to 2011 which were not investment companies and banks	231 companies
The number of companies with financial year ending to the end of March 20th	194 companies
The number of companies which did not change financial year in the studied year	187 companies
The number of companies which did not have transactional symbol stoppage of more than 4 months	151 companies
The number of companies, data of which were collected (final sample)	151 companies

**7. Method of hypotheses testing**

In this research, six hypotheses were mentioned, among which the first to fifth ones investigated effect of different factors on cash balance and the sixth hypothesis focused on effect of excess cash on return of companies.

*1. Testing the first hypothesis*

$$CASH_{i,t} = \beta_0 + \beta_1 CASH_{i,t-1} + \beta_2 MTB_{i,t} + \beta_3 \Delta INV_{i,t} + \beta_4 FIN_{i,t} + \beta_5 \Delta CF_{i,t} + \beta_6 \Delta CASH_{i,t} + \varepsilon_{i,t} \quad (10)$$

Where:

CASH: ratio of cash balance to total assets

MTB: growth opportunities of a company (ratio of capital market value to capital book value)

$\Delta INV$ : change in long-term investment (control variable)

FIN: net financing of company (control variable)

$\Delta CF_i$ : change in net cash flow (control variable).

$\Delta CASH$ : change in cash balance (control variable)

*2. Testing the Second hypothesis*

$$CASH_{i,t} = \beta_0 + \beta_1 CASH_{i,t-1} + \beta_2 SIZE_{i,t} + \beta_3 \Delta INV_{i,t} + \beta_4 FIN_{i,t} + \beta_5 \Delta CF_{i,t} + \beta_6 \Delta CASH_{i,t} + \varepsilon_{i,t} \quad (11)$$

*3. Testing the third hypothesis*

$$CASH_{i,t} = \beta_0 + \beta_1 CASH_{i,t-1} + \beta_2 LEV_{i,t} + \beta_3 \Delta INV_{i,t} + \beta_4 FIN_{i,t} + \beta_5 \Delta CF_{i,t} + \beta_6 \Delta CASH_{i,t} + \varepsilon_{i,t} \quad (12)$$

*4. Testing the fourth hypothesis*

$$CASH_{i,t} = \beta_0 + \beta_1 CASH_{i,t-1} + \beta_2 OCF_{i,t} + \beta_3 \Delta INV_{i,t} + \beta_4 FIN_{i,t} + \beta_5 \Delta CF_{i,t} + \beta_6 \Delta CASH_{i,t} + \varepsilon_{i,t} \quad (13)$$

*5. Testing the fifth hypothesis*

$$CASH_{i,t} = \beta_0 + \beta_1 CASH_{i,t-1} + \beta_2 NWC_{i,t} + \beta_3 \Delta INV_{i,t} + \beta_4 FIN_{i,t} + \beta_5 \Delta CF_{i,t} + \beta_6 \Delta CASH_{i,t} + \varepsilon_{i,t} \quad (14)$$

*6. Testing the sixth hypothesis*

$$R_{it} = \beta_0 + \beta_1 XLIQ_{i,t} + \beta_2 \Delta CASH_{i,t} + \beta_3 CASH_{i,t-1} + \beta_4 SIZE_{i,t} + \beta_5 LEV_{i,t} + \beta_6 BETA_{i,t} + \varepsilon_{i,t} \quad (15)$$

Where:

R: total stock return in a definite period

XLIQ: ratio of excess cash to market value of company shares

BETA: beta coefficient as the control variable

**1) Results obtained from testing the first hypothesis**

Generally, in the present research, the factors which affected cash reserves of the statistically sampled companies were studied and their excess cash was estimated. The first hypothesis predicted a significant relationship between ratio of market value to book value of the company and cash balance. To test this hypothesis, a regression model, in which cash balance was the dependent variable and a function of market value to book value ratio (as growth opportunities) of the company, was used. Fitting of regression models is based on panel data method which is a suitable method for estimating regression of the data consisting of time series and sections. Panel method can be based on two types of fixed and random effects, which are recognized using Hausman test. Hausman test is a test which compares fixed and random effects with each other. Thus, regression model was first studied based on the fitted random effects and then suitability of the applied method was investigated using Hausman test. Statistical hypotheses relating to Hausman test were as follows:

H0: Regression is based on fixed effects.

H1: Regression is based on random effects.

Results of Hausman test for testing the first hypothesis model are given in Table 2.

*Table 2. Results of Hausman test for regression model of the second hypothesis*

Significance level	Degree of freedom	Chi-sq statistic
0.000	6	144.347

The findings indicated rejection of H0. On this basis, it was recommended to use random effects method for fitting regression model of the first hypothesis. Therefore, regression model of the first hypothesis was fitted based on panel data using random effects method. The results obtained from model fitting are given in Table 3.

*Table 3. Results of statistical analysis for testing the first hypothesis*

Significance level of F	F statistic	Durbin-Watson statistic	Modified R <sup>2</sup>
0.000	2330	1.866	0.539
Significance level (P-value)	t statistic	Size of $\beta$ coefficient (standardized)	Variable
0.000	97.35	0.805	CASH <sub>i,t-1</sub>
0.000	-3.993	-0.001	MTB
0.000	-4.594	-0.021	$\Delta$ INV
0.04	-2.054	-0.007	FIN
0.449	0.755	0.000	$\Delta$ CF
0.000	112.277	0.93	$\Delta$ CASH

Results of statistical analysis regarding validity of regression model are given in first part of the above table. Coefficient of determination of the model was 0.539, indicating that the regression model explained 53.9% of changes in cash balance through changing independent and control variables. Also, the results showed that Durbin-Watson statistic was between 1.5 and 2.5; therefore, there was not strong autocorrelation between errors of the regression model.

The results demonstrated that significance level of F statistic was lower than error level of test ( $\alpha=0.05$ ); as a result, at least one of the independent variables was statistically significant. The estimated coefficient for MTB variable which indicated the relationship between company's ratio of market value to book value and cash balance was -0.001 at significance level of 0.000, which was below 0.05 (rate of test error).

This finding indicated a significantly reverse relationship between growth opportunities of statistical sample companies and their cash reserves during the research period. In other words, the higher (lower) the company's ratio of market value to book value with cash balance (growth opportunities), the lower (higher) the tendency of companies to hold cash in the company.

In sum, the results showed that ratio of market value to book value of the statistically sampled companies had a significantly reverse relationship with cash balance. This finding was in line with claim of the first hypothesis; as a result, this hypothesis was accepted at confidence level of 95%.

## 2) Results of testing the second hypothesis

Results of Hausman test for the second hypothesis model are given in Table 4.

Table 4: Results of Hausman test for regression model of the second hypothesis

Significance level	Degree of freedom	Chi-sq statistic
0.000	6	149.613

The findings indicated rejection of H0. On this basis, it was recommended to use random effects method for fitting regression model of the second hypothesis. Therefore, regression model of the second hypothesis was fitted based on panel data using random effects method. The results obtained from model fitting are given in Table 5.

Table 5. Results of statistical analysis for testing the second hypothesis

Significance level of F	F statistic	Durbin-Watson statistic	R <sup>2</sup> modified
0.000	2309	1.836	0.539
Significance level (P-value)	t statistic	Size of $\beta$ coefficient (standardized )	Variable
0.000	96.615	0.801	CASH <sub>i,t-1</sub>
0.003	-2.974	-0.001	Size
0.000	-4.516	-0.021	$\Delta$ INV
0.046	-1.992	-0.007	FIN
0.617	0.499	0.000	$\Delta$ CF
0.000	112.114	0.929	$\Delta$ CASH

Coefficient of determination of the model for testing the second hypothesis indicated that 54% of changes in cash balance were explained by changes of independent and control variables included in the above model. Also, the results showed that Durbin-Watson statistic was between 1.5 and 2.5; therefore, there was not strong autocorrelation between errors of the regression model. The results also demonstrated that significance level of F statistic was lower than error level of the test ( $\alpha=0.05$ ); as a result, at least one of the independent variables was statically significant.

According to the above findings, the estimated coefficient for variable of company size was -0.001 at significance level of 0.003, indicating a significantly reverse relationship between company size of the statistically sampled companies and cash balance during the research period. In other words, companies with larger (smaller) size had lower (higher) tendency to reserve cash in their companies. The findings obtained from testing the second hypothesis regarding control variables were in line with those of the first hypothesis and showed a significantly reverse relationship between change in long-term investments and financing rate with cash balance while changes of net cash flow had no significant relationship with cash balance.

In sum, the results showed that size of the statistically sampled companies had a significantly reverse relationship with cash balance. This finding was in line with claim of the second hypothesis; as a result, this hypothesis was accepted at confidence level of 95%.

## 3) Results of testing the third hypothesis

Results of Hausman test for model of testing the third hypothesis model are given in Table 6.

Table 6. Results of Hausman test for regression model of the third hypothesis

Significance level	Degree of freedom	Chi-sq statistic
0.000	6	148.54

The findings rejected H0. On this basis, it was recommended to use random effects method for fitting regression model of the third hypothesis. Therefore, regression model for testing the third hypothesis was fitted based on panel data using random effects method. The results obtained from model fitting are given in Table 7.

Table 7. Results of statistical analysis for testing the third hypothesis

Significance level of F	F statistic	Durbin-Watson statistic	Modified R <sup>2</sup>
0.000	2300	1.837	0.538
Significance level (P-value)	t statistic	Size of $\beta$ coefficient (standardized)	Variable
0.000	96.12	0.803	CASH <sub>i,t-1</sub>
0.427	-0.793	0.000	Lev
0.000	-4.856	-0.023	$\Delta$ INV
0.025	-2.233	-0.008	FIN
0.662	0.439	0.000	$\Delta$ CF
0.000	111.105	0.929	$\Delta$ CASH

According to the above findings, the estimated significance level for variable of financial lever was above 0.05. This finding indicated lack of significant relationship between financial lever and cash balance of the statistically sampled companies. The findings obtained from testing the third hypothesis regarding control variables were in line with those of the previous hypothesis. In sum, the results showed that size of the statistically sampled companies had a significantly reverse relationship with cash balance. This finding indicated lack of relationship between financial lever and cash balance of the statistically sampled companies. On this basis, the third hypothesis was rejected at confidence level of 95%.

#### 4) Results of testing the fourth hypothesis

Results of Hausman test for model of the fourth hypothesis are given in Table 8.

Table 8. Results of Hausman test for regression model of the fourth hypothesis

Significance level	Degree of freedom	Chi-sq statistic
0.000	6	153.893

The findings rejected H0. Accordingly, it was recommended to use random effects method for fitting regression model of the fourth hypothesis. Therefore, regression model of the fourth hypothesis was fitted based on panel data using random effects method. The results obtained from model fitting are given in Table 9.

Table 9. Results of statistical analysis for testing the fourth hypothesis

Significance level of F	F statistic	Durbin-Watson statistic	Modified R <sup>2</sup>
0.000	2298	1.829	0.538
Significance level (P-value)	t statistic	Size of $\beta$ coefficient (standardized)	Variable
0.000	96.36	0.801	CASH <sub>i,t-1</sub>
0.052	1.93	0.005	OCF
0.000	-4.915	-0.023	$\Delta$ INV
0.026	-2.221	-0.008	FIN
0.896	-0.13	0.000	$\Delta$ CF
0.000	112.07	0.93	$\Delta$ CASH

According to the above findings, estimated coefficient for OCF variable which showed a relationship between operating cash flow and cash balance was 0.005 at significance level of 0.052. This finding indicated a significantly direct relationship between the above variables at confidence level of 90%. In other words, companies with more operating cash flow held higher cash reserves. The findings obtained from testing the fourth hypothesis regarding control variables were in line with those of the previous hypothesis. Considering the obtained results, relationship between operating cash flow and cash balance was significant at confidence level of 90%. The fourth hypothesis and its mentioned claim were accepted at the considered confidence level.

### 5) Results of testing the fifth hypothesis

Results of Hausman test for model of the fifth hypothesis are given in Table 10.

Table 10. Results of Hausman test regression model of the fifth hypothesis

Significance level	Degree of freedom	Chi-sq statistic
0.000	6	146.787

The findings rejected H0. Thus, using random effects method was recommended for fitting regression model of the fifth hypothesis. Therefore, regression model of the fifth hypothesis was fitted based on panel data using random effects method. The results obtained from model fitting are given in Table 11.

Table 11. Results of statistical analysis for testing the fifth hypothesis

Significance level of F	F statistic	Durbin-Watson statistic	Modified R <sup>2</sup>
0.000	2298	1.839	0.538
Significance level (P-value)	t statistic	Size of $\beta$ coefficient (standardized )	Variable
0.000	94.61	0.802	CASH <sub>i,t-1</sub>
0.426	0.794	0.000	NWC
0.000	-4.747	-0.022	$\Delta$ INV
0.022	-2.283	-0.008	FIN
0.655	0.446	0.000	$\Delta$ CF
0.000	110.57	0.928	$\Delta$ CASH

According to the above findings, estimated coefficient for NWC which showed a relationship between net operating capital and cash balance was more than 0.05. This finding indicated lack of statistically significant relationship between the above variables. In other words, operating capital level had no effect on cash reserves of the statistically sampled companies. The findings obtained from testing the fifth hypothesis regarding control variables were in line with those of the previous hypothesis. Considering the obtained results, there was no significant relationship between net operating capital and cash balance. Therefore, the fifth hypothesis and its mentioned claim were rejected at confidence level of 95%.

### 6) Results of testing the sixth hypothesis

Results of Hausman test for model of the sixth hypothesis are given in Table 12.

Table 12: Results of Hausman test for regression model of the sixth hypothesis

Significance level	Degree of freedom	Chi-sq statistic
0.073	6	11.52

The findings accepted H0. Accordingly, using fixed effects method was recommended for fitting regression model of the sixth hypothesis. Therefore, regression model of the sixth hypothesis was fitted

based on panel data using fixed effects method. The results obtained from model fitting are given in Table 13.

Table 13. Results of statistical analysis for testing the sixth hypothesis

Significance level of F	F statistic	Durbin-Watson statistic	Modified R <sup>2</sup>
0.012	11.292	2.422	0.204
Significance level (P-value)	t statistic	Size of $\beta$ coefficient (standardized)	Variable
0.011	-2.549	-9.865	XLIQ
0.008	2.648	9.533	$\Delta$ CASH
0.007	2.663	8.062	CASH <sub>i,t-1</sub>
0.208	1.018	0.098	SIZE
0.363	-0.909	-0.203	LEV
0.001	3.195	0.073	BETA

Coefficient of determination of the sixth hypothesis was 0.204, which indicated that this regression model could explain 20% of changes in stock return of statistically sampled companies during the research period through changing independent and control variables. Also, the results showed that Durbin-Watson statistic was between 1.5 and 2.5; therefore, there was no strong autocorrelation between errors of the regression model. Significance level of F statistic was lower than error level ( $\alpha=0.05$ ); as a result, at least one of the independent variables was statically significant.

According to the findings presented in the above table, estimated coefficient of XLIQ which showed a relationship between excess cash holding and stock return was significantly negative. This finding indicated a significantly reverse relationship between excess cash holding and stock return. The obtained results were in line with claim of the sixth hypothesis and theoretical fundamentals of the research, showing that investors had undesirable reaction to excess cash holding.

As far as control variables applied to testing the sixth hypothesis were concerned, the results showed that changes in cash balance and cash balance of the previous period had a significantly direct relationship with stock return. In other words, they demonstrated desirable reaction to increased cash balance. The coefficient estimated for systematic risk variable was significantly positive and indicated that shares of the companies with a higher risk had higher return to investors. Considering the above results and according to the prediction mentioned in the sixth hypothesis and theoretical fundamentals of the research, there was a significantly reverse relationship between excess cash holding and stock return. Therefore, the above hypothesis was accepted at confidence level of 95%.

## 8. Conclusions

The results showed that companies with higher ratio of market value to book value held lower cash reserves. It seems that the above features played a role in determining cash holding policies of the companies and they potentially prevented cash holding. According to the findings, the companies which earned higher operating cash flow had higher cash balance. The results obtained from testing the sixth hypothesis demonstrated that excess cash holding reduced stock return of the companies and, in fact, investors showed undesirable reaction to excess cash flow. It seems that features of managers, especially their risk taking, play an important role in management of operating cash flow. Entrance of cash resources resulting from continual activity of profit units may also increase opportunistic incentive of their managers to save the mentioned resources regardless of their risk-taking. According to the experimental evidence, proper cash management can increase productivity of company resources and their investment in projects with positive net present value and increase stock return. Accordingly, the companies which held desirable cash level could achieve more net profit and this issue had positive and direct effects on their stock return. In this regard, negative relationship between stock return and excess cash might result from reaction of shareholders and actors of capital market to the information of stock companies. If results obtained from this research are considered from this viewpoint, it should be assumed that market actors are well-informed people or have access to internal information of companies. In this regard, people are informed

of excess and stagnant cash resources in companies and show a negative reaction to it; as a result, price and return of stock are reduced. In this regard, well-informed and professional investors can evaluate the cash held by managers through analyzing financial statements of corporations.

### 9. Applied Recommendations of the Research

1. While determining cash holding policies, managers of profit units are recommended to pay attention to special factors and features of their units and adopt strategies which are in proportion to these features. In this regard, it is recommended to consider acceptability rate of shares in capital market, operational capacity of company, total assets and ability to make cash flows.

2. Shareholders and creditors of corporations are also recommended to study application extent of supervisory and corporate governance mechanisms of managers in terms of applying cash resources and ensure presence of effective and efficient mechanisms before making decisions about investment.

3. Considering the results obtained from testing the hypotheses, managers of corporations are recommended to avoid accumulation of cash reserves in companies because the finding showed that this issue had an undesirable effect on stock price and return.

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