



The Impact of Inflation Rate and Operating Cycle on Cash Holdings of Firms

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ABSTRACT

The Cash is the vital source of any economic unit. Maintaining a balance between available cash and cash needs is one of the most important factors of economic health and activity continuity of the business units. In addition, due to the inflation situation that exists, most of Iranian firms prefer to convert their cash into other assets. Although, such a common phenomenon is considered as resistance shield against inflation, the secondary effect of this is that the firms become helpless in the debt maturity and the reputation of the organization will be hurt. The main objective of this study is to investigate the impact of inflation rate and operating cycle on cash holdings of listed firms on the Stock Exchange of Iran. To achieve this goal, a sample consisting of 80 firms listed on the Tehran Stock Exchange, during the years 2006 to 2014, is studied. To verify the hypotheses, multiple regression method is used. The results of testing the hypotheses demonstrate that the operating cycle and inflation have a significant impact on cash holdings. This can be a sign of the firm's response to inflation. That is to say, at the time of inflation, firms tend to keep more cash, rather than exchanging the cash to other assets and when the operating cycle is high, firms tend to reduce cash holdings in the firm to other assets that will lead to the firm's profitability.

Keywords: Inflation, Operating Cycle, Cash Holdings.

INTRODUCTION

Several functions have been enumerated for accounting. One of them is the dissemination of useful information to investors to enable them to evaluate the securities. Since the primary and famous investigation¹, a wide range of financial studies investigated the relationship between accounting earnings and market value and cash. In general, the results of this body of knowledge indicate that the market value is partially explained by accounting earnings. Therefore, further studies investigated other relevant accounting and non-accounting factors for better predicting and explaining the market value.

Mainly the intrinsic value per share is taken into account, because scientifically and relying on various scientific tools such as economics, statistics, financial information, etc. stock value is determined. Here to determine the intrinsic value per share, the financial statements, dividend records, management policies, sales growth, the institution ability in increasing the profitability, liquidity and other factors are reviewed, then the resulting intrinsic value is compared to the current price, and decisions are made about purchasing, selling or keeping shares. Therefore, academic circles believe that fundamentalists consider more accurate principles, compared to other common approaches, for determining the value.

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The phenomenon of inflation has obviously put its impact on all aspects of human life. Inflation is an important and stable truth, which most countries are grappling with. Inflation is the situation, in which the general price level increases continually and over time².

In the situation of inflation, in terms of the decrease in purchasing power and increase in liquidity, the service (utility) value of the latest currency holdings is less than the anticipated holding costs. Therefore, the cost of cash holdings is increased and the firms try to optimize the natural equilibria. On the other hand, the increase in firm's operating cash flow leads to the shortening of the length of the firms operating cycle. Thus, the firm's working capital requirement is decreased³.

Working capital is a basic requirement of the organization to adapt in a challenging economy and aims to establish a delicate balance between maintaining liquidity to support daily operations and maximize short-term investment opportunities. Hence, the operating cycle duration has always been one of the major factors affecting cash holding and is of particular salience. Dechow states that, operating cycle is the mean of time spent between cash payment period to produce goods and cash received from selling goods³.

The issue of how self-interested managers select between consumption and retention of cash reserves, is an unclear issue, which requires further study. Therefore, the present study aims to investigate the issue, whether the inflation and operating cycle of a firm can affect its cash holdings.

LITERATURE REVIEW

How to use the internal funds is an important decision in the conflict between shareholders and managers. In the era of economic growth, as cash reserves are increased, managers decide about the cash whether to be distributed to the shareholders, spent for domestic expenditures, employed for foreign qualifications or continue to be maintained? Residual of the excess cash is the cash in excess of those funds that are necessary for positive net current valuable projects. In other words, it is desirable that a profit unit hold the cash only at the level that can use the investment opportunities in positive net current valuable projects. The funds are important in this respect that allows firms to seek opportunities that can increase shareholder value⁴. Without cash, new product development, doing business acquisition, cash earnings paid to shareholders and debt reduction are not possible. Furthermore, cash must be maintained at a level between the cost of cash holding and the cost of balance insufficient cash⁵.

Although the cash held on the balance sheet is considered as the important assets for the firm, holding these assets more than enough, can be a sign of inefficiency in resource allocation and impose heavy costs on firms. Some of the costs include the capital opportunity cost and the agency cost related to monitoring. The most important factor of surplus cash holdings is information asymmetry and problems arising from it⁶.

The presence of this factor leads to acquiring costly cash. In these circumstances the firm may double its cash assets to reduce costs of external financing.

These factors include growth opportunities, size, maturity of the debt, bank debt and asymmetric information⁵. Information asymmetry theory, agency theory, equilibrium theory, finance hierarchy theory and the theory of free cash flow are the theories related to cash holdings. According to information asymmetry, the decrease in information asymmetry (for example by increasing the quality of financial reporting) can decrease cash holdings by the firms. According to agency theory, the conflicts that lead to the identification of agency costs, can be applied to justify the cash holdings behavior by management.

According to equilibrium theory, firms determine the optimal amount of cash by establishing an equilibrium (balance) between benefits and costs of holding cash. According to finance hierarchy theory, the Board of Directors is willing to accumulate cash to finance, in the first stage, from inside of the firm and do not refer to the outside of the firm.

According to free cash flow theory, managers have an incentive to accumulate cash to increase the resources under their control in order to be able to benefit from the judgment and detection power regard to the firm's investment decisions ⁷.

J. Yang et al (2011) on a study entitled "Factors affecting cash holdings: Empirical study in the restaurant industry", investigated the factors affecting the level of cash holdings in 125 firms during the years 1997 to 2008. Their results show that the restaurant firms with more investment opportunities are more willing to hold cash. In addition, firms that have higher liquidity levels, cost of capital and dividend payments, hold less cash ⁸.

El-Najjar (2012) in his investigation entitled "Financial factors determining cash holdings: Evidence from some emerging markets", evaluated the factors affecting cash holdings of capital structure and dividend policy (in developing countries), Brazil, India, Russia and China. Then he compared the obtained results with Britain and America. Results show that capital structure and dividend policy are effective on cash holdings and there are similarities between developed and developing countries in relation to the factors influencing cash holdings ⁹.

Wang et al (2014) in his research entitled "Inflation, operating cycle and cash holdings", studied a sample of firms operating in the Chinese stock market to assess the impact of inflation and operating cycle on cash holdings. The results of this study suggest that there is a relationship between operating cycle and cash holdings that this relationship is affected by inflation ¹⁰.

Research Hypotheses

According to the objectives stated in the study, the following hypotheses are tested:

First Hypothesis: Inflation has an impact on cash holdings of firm.

Second Hypothesis: Operating cycle has an impact on cash holdings of firm.

Research Methodology, population and Sample

The present study is an applied research in terms of objective. With regard to method and nature, the research is a descriptive - correlational study. The statistical population of the study consists of all firms listed on Tehran Stock Exchange for the fiscal years 2006 to 2014, and among the firms of Tehran Stock Exchange, 80 firms are selected in the range of the years 2006 to 2014 as the research sample.

Data Analysis Method

Model of research hypotheses test is multiple regression. First, F Limer test is used to determine the panel or pool data. In the case of pool data, the multiple regression model (OLS) is used. If the data is panel, first, Hausman test is used to specify random or fixed coefficients. After determining the type of correlation, panel data test is applied to evaluate the model and test the hypotheses. Statistical data analysis of the study is carried out using stata software version 12.

Research Model and Variables

$$\text{CASH} = \alpha + \beta_1 \text{ Inflation} + \beta_2 \text{ SIZE} + \beta_3 \text{ AGE} + \varepsilon$$

$$\text{CASH} = \alpha + \beta_1 \text{ Operation cycle} + \beta_2 \text{ SIZE} + \beta_3 \text{ AGE} + \varepsilon$$

The dependent variable of the present study is the level of cash of firms and it is measured as follows:

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Cash Holdings:

It is calculated through the proportion of cash at hand to total assets.

$$\text{Cash} = \text{Cash At Hand} / \text{Total Assets}$$

Inflation Rate:

In this study, the consumer price index (CPI) is used for the calculation of inflation rate, which is measurable through the central bank, and is calculated as follows.

$$\text{INF} = (\text{CPI}_{i,t} - \text{CPI}_{i,t-1}) \div \text{CPI}_{i,t-1} \times 100$$

In this formula, CPI_t is the consumer price index at the end of the period, CPI_{t-1} is the consumer price index at the beginning of the period and INF is the inflation rate. The inflation rate is extracted from the Central Bank.

Operating Cycle:

Operating cycle is the mean of cash payment period to produce and receive cash from sales.

$$\text{operation cycle} = \left(\frac{\frac{\text{Ar}_t + \text{Ar}_{t-1}}{2}}{\text{Sales}} \right) + \left(\frac{\frac{\text{Inv}_t + \text{Inv}_{t-1}}{2}}{\text{COGS}} \right) + \left(\frac{\frac{\text{Ap}_t + \text{Ap}_{t-1}}{2}}{\text{Purchases}} \right)$$

Operation cycle: Operating cycle

Art: Accounts receivable of the current period

Invt: inventory of the current period

Apt: Accounts payable of the current period

Sales: Net sales

COGS: cost of goods sold

Purchases: cost of goods sold + inventory of the end of the period – inventory of the beginning of the period

Firm Size: Natural logarithm of total assets book value.

Firm Age: Number of years passed from the firm's arrival to Tehran Stock Exchange until 2014.

RESULTS

When a mass of quantitative data are collected for the study, first organizing and summarizing them in a way that are significantly understandable and communicable is essential. Descriptive statistics are used for this purpose. In a summary, using descriptive statistics properly, the characteristics of a bunch of information can be represented exactly. Descriptive statistics are always applied to determine and express research information characteristics.

Table (1) Descriptive Statistics of Research Variables

Variable	ABRB	Mean	Max	Min.	SD
Operating Cycle	OP	0.54	2.58	0.1	0.61
Cash Holdings	CASH	0.117	0.427	0.158	0.196
Inflation	INF	21.3	34.7	11	19.14
Firm Size	SIZE	6.74	8.71	3.54	7.89
Firm Age	AGE	27.2	47	3	31.3

First Hypothesis Test

H0: Inflation has no impact on cash holdings of firm.

H1: Inflation has an impact on cash holdings of firm.

Results of Table 2 show the optimization of the model to test the hypothesis. Statistic F (11.15) and the significance level (0.000) confirm the significance of the model to test the hypothesis. Waldridge Test results indicate the absence of autocorrelation between residuals.

The adjusted determination coefficient is 39. Variable of inflation, is known as the independent variable, cash holdings as dependent variable, and firm size and firm age as control variables of the research. Variable of inflation, considering its significance level in the table above, has an inverse negative relationship with variable of cash holdings. Control variables of firm size and firm age affect the relationships between variables. As a result, according to the results of table above, the first hypothesis based on the impact of inflation on cash holdings of listed firms on Tehran Stock Exchange, is accepted.

Table (2) First Hypothesis Test

CASH = $\alpha + \beta_1$ Inflation + β_2 SIZE + β_3 AGE+ ϵ				
Variable	ABRB	Coefficient	Statistics t	Significance Level
Inflation	INF	-0.94	-4.58	0.000
Firm Size	SIZE	0.18	2.68	0.016
Firm Age	AGE	0.41	3.98	0.000
Fixed Value	C	0.66	1.25	0.197
Adjusted Determination Coefficient		0.41	F Statistics	11.15
			Significance Level	0.000

Second Hypothesis Test

H0: Operating cycle has no impact on cash holdings of firm.

H1: Operating cycle has an impact on cash holdings of firm.

Results of Table 3 show the optimization of the model to test the hypothesis. Statistic F (8.65) and the significance level (0.000) confirm the significance of the model to test the hypothesis. Waldridge Test results indicate the absence of autocorrelation between residuals.

The adjusted determination coefficient is 39. Variable of operating cycle, is known as the independent variable, cash holdings as dependent variable, and firm size and firm age as control variables of the research. Variable of operating cycle, considering its significance level in the table above, has an inverse negative relationship with variable of cash holdings. Control variables of firm size and firm age affect the relationships between variables. As a result, according to the results of table above, the second hypothesis based on the impact of operating cycle on cash holdings of listed firms on Tehran Stock Exchange, is accepted.

Table (3) Second Hypothesis Test

CASH = $\alpha + \beta_1$ Operation cycle + β_2 SIZE + β_3 AGE+ ϵ				
Variable	ABRB	Coefficient	t Statistics	Significance Level
Operating Cycle	OP	-0.418	-2.87	0.007
Firm Size	SIZE	0.56	3.34	0.000
Firm Age	AGE	0.21	2.96	0.004
Fixed Value	C	0.98	0.697	0.42
Adjusted Determination Coefficient		0.39	F Statistics	8.65
			Significance Level	0.000

CONCLUSION

Cash is the vital source of any economic unit. Maintaining a balance between available cash and cash needs is one of the most important factors of economic health and activity continuity of the business units. In addition, due to the inflation situation that exists, most of Iranian firms prefer to convert their cash into other assets. Although, such a common phenomenon is considered as resistance shield against inflation, the secondary effect of this is that the firms become helpless in the debt maturity and the reputation of the organization will be hurt.

Experience has shown that most of the firms that are facing bankruptcy and financial distress, often have suffered bad management of working capital and weaknesses in the control of cash. Although the cash held on the balance sheet is considered as the important assets for the firm, holding these assets more than enough, can be a sign of inefficiency in resource allocation and impose heavy costs on firms. Cash flow plays an important role in many financial decisions, securities valuation models, and methods of assessment of investment projects. How to use the cash is an important decision in the conflict between shareholders and managers. In the era of economic growth, as cash reserves are increased, managers decide about the cash whether to be distributed to the shareholders, spent for expenditures, or employed for qualifications of assets. The issue of how self-interested managers select between consumption and retention of cash reserves, is an unclear issue, which requires further study. Reasonably, they compare the benefits obtained from current foreign expenditures with the flexibility generated from cash. In addition, managers measure the likelihood of interest surplus to future expenditures derived from excess cash holdings and always seek to hold a level of cash that is in optimal state, considering the advantages and disadvantages of cash holding.

The first hypothesis, regard to the impact of inflation on cash holdings level, is tested using multivariate regression statistical method. According to the results of the panel data test, this hypothesis is confirmed. Cash holdings of the firm are affected by inflation. This can be a sign of the firm's response to inflation. That is to say, at the time of inflation, firms tend to keep more cash, rather than exchanging the cash to other assets. The results of the present study are consistent with the results of the research carried out by ^{4,10}.

The second hypothesis, regard to the impact of operating cycle on cash holdings level, is tested using multivariate regression statistical method. According to the results of the panel data test, this hypothesis is confirmed. Cash holdings of the firm are affected by operating cycle. This can be a sign of the firm's response to operating cycle. That is to say, when the operating cycle is high, firms tend to reduce cash holdings in the firm to other assets that will lead to the firm's profitability. The results of the present study are consistent with the results of the research carried out by ¹⁰.

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Statistical Appendix:

Reliability of Model Variables:

Before testing the research hypotheses, the reliability and unreliability test should be performed for the research variables, because the nature of the research variables is a kind of pool data on the one hand and in the hypotheses, panel method is used to estimate, on the other hand, and the requirement to use linear regression model, using panel method to estimate the desired model for testing the hypotheses, is the stability of the variables. To achieve this goal, the test of Levin, Lin-Chu is used. Test results of Levin, Lin-Chu at variables level is shown in Table (2).

H0: Model variables are not reliable.

H1: Model variables are reliable.

Table (2): Results of Levin, Lin-Chu for the Model Variables

Variable	ABRB	Levin, Lin-Chu test statistic	Level	Significance
Operating Cycle	OP	-7.35	I(0)	0.000
Cash Holdings	CASH	-21.16	I(0)	0.000
Inflation	INF	-11.24	I(0)	0.000
Firm Size	SIZE	-9.64	I(0)	0.000
Firm Age	AGE	-8.74	I(0)	0.000

Given the significance level of variables, which is shown in the table above, all variables have static during the period of investigation.

Linearity Test:

Linearity is the situation that shows an independent variable is a linear function of other independent variables. If linearity is high in a regression equation, this means that there is a high correlation between independent variables and it is possible that despite the high R², the model does not have a high validity. In other words, despite the fact that the model looks good, it does not have significant independent variables. If the linearity is confirmed, there is a series of problems to determine the accuracy of the regression equation. Linearity test of the research variables is as the following table:

Table (4) Linearity Test

Variable	ABRB	1	2
Inflation	INF	2.12	-
Firm Size	SIZE	1.054	1.99
Firm Age	AGE	4.14	3.12
Operating Cycle	OP	-	2.09

Special values represent the probability of internal correlation between variables. Values greater than 15 indicate the likelihood of linearity between the independent variables and values over 30 indicate a serious problem in the use of regression in the status quo (Hasas Yeganeh et al, 2009). However, all values are smaller than 15, which indicate the absence of linearity between independent variables.

F Limer Test:

A question that often arises in practical studies is that whether there is evidence indicating the ability to merge data or the model is different for all cross-sectional units. Therefore, first, it should be checked whether there is heterogeneity or individual differences between the sections. If there is heterogeneity, fixed effect model is applied and otherwise, the pool data method, with the approach of least squares estimation is used to estimate the model. For this purpose F-

Limmer test is performed. In this test, the null hypothesis H₀ of the same intercepts (Pooled Data Method) is placed against the alternative hypothesis H₁ of intercepts anisotropy (Panel Data Method).

If it is determined that the studied sections are heterogeneous and have individual differences, fixed effects method is better. To choose between fixed and random effects Hausman test is used. Hausman test statistic, which is calculated for the detection of fixed or random differences of cross-sectional units, has chi-square distribution with degrees of freedom equal to the number of independent variables. F Limer test results are presented in table (5):

Table (5) F Limer Test

Null Hypothesis	Research Model	Effects Test	Statistics	Significance Level	Test Results
	1	F	4.36	0.000	Fixed Effects Method
	2	F	4.31	0.000	Fixed Effects Method

In F test, the null hypothesis of the use of pool data method is shown against the alternative hypothesis, namely the use of fixed effects method. Due to the significant level of above table, the test result indicates the fact that the studied sections are heterogeneous and using fixed effects method is better. After selecting panel data method using F Limer test, Hausman test is carried out. In this test, if the null hypothesis (H₀) is accepted, the random-effects model is used and in case of rejection of H₀ the fixed effects model is used.

Hausman Test:

Hausman test defines the state of being random or fixed. Null hypothesis (Random Effects Method) in this test means that there is no correlation between the disturbing component related to intercept and the explanatory variables and they are independent of each other. While the alternative hypothesis (Fixed Effects Method) means that there is a correlation between the disturbing component and explanatory variables. If the null hypothesis is rejected, fixed effects model is used and otherwise, random effects method is used.

H₀: Effects model is random.

H₁: Effects model is fixed.

Table (6) Hausman Test

Test Result	Significance	Chi-square statistic	Test Summary	Hypothesis
Fixed Effects Method	0.0027	14.12	Random Period	1
Fixed Effects Method	0.0057	12.54	Random Period	2

The results show that the value of this statistic for each of the models is significant. In addition, the significant level reported in the table above (p-value <.05) indicates the rejection of the hypothesis H₀ at 95% confidence level for the model, which implies the use of fixed effects approach.