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Inflation, Operating Cycle, Cash Holding

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ABSTRACT

The purpose of this paper is to examine the effects of inflation and operating cycle on cash holding in Tehran Stock Exchange in the period 2010 to 2014.The sample is comprised of 103 companies which are selected by systematic elimination method and total of 515 year-firm collected. In this study for testing the hypothesis is used of linear regression and correlation. To analyse data and test hypotheses is used of Eviews software. After designing and testing hypotheses for each main hypothesis, it was concluded that inflation and operational cycle has not a significant impact on the level of firm's cash holding. The results show no significant effect of inflation through the operating cycle on cash holding.

1 Introduction

Cash holding strategy of a company is to balance between the costs and profits resulting from cash holdings. Companies tend to adjust and optimize its cash saving in strategies response to changes in their purchasing power due to inflation. Operating cash shows the speed and flow of cycle and also affects the company's strategy to save the cash. The strategy of cash holding determines the fate and future of the company. Small companies tend to maintain their cash for future business and reduce the risk of accumulation and holding. However, over cash holding increases the cost of opportunity while under cash holding results in deficit of costs in the predicament of investment [10]. As we know, when a company approaches maturity debt, is forced to use of its own cash to settle debts.

If the company has not enough cash resources is forced to use of another debt that increases the risks of the company. Of course there also is a way that helps the company in order to financing such as bonds or sell stock through capital increase or the sale of assets, but due to these need more time, companies have to use the fastest way for financing means debt. On the other hand, the operating cycle refers to time required for the purchase of raw materials and collecting the proceeds from sales of goods. The longer time, more investment is needed in working capital and less the cash conversion cycle indicates that the company liquidity situation is better. Companies that hold realizable assets tend to hold less cash. They can transfer their assets to cash by lower cost if they were in periods of inflation and when the price is higher than their book value.

Therefore, instead of keeping the money companies are willing to hold realizable assets. The long of company's operating cycle is influence of industry characteristics, business model and management

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efficiency. Generally, for annihilating the company's concerns, the operating assets and working capital should be in balance.

In other words, from the perspective of demand, if the products have a shorter operating cycle, relatively less time capital flows and companies must continuously invest money to complete the cycle of purchasing, production and sale. From the perspective of offering, the shorter operating cycle means that the process of obtaining sale inventory and making money is short. In contrast, companies with longer operating cycles have longer purchasing of raw materials and production. From the perspective of demand, period of continuous investment and increasing in production and productivity can decrease cash reserves in the average.

From the perspective of an offering, longer operating cycle means that turnover is slower than cash flow, purchase and sale of inventory and improving the receivable accounts. Then purpose of this study is to evaluate the impact of inflation and operating cycle on cash holdings in Tehran Stock Exchange and to answer to this question of whether inflation and operating cycle have or have not an impact on the level of cash holdings?

2 Theoretical Foundation and Research Background

Kusnadi, et al [4] believed that companies in provinces with more developed institutions (non-government-controlled companies) hold more cash reserves than the companies located in the provinces with less developed institutions (government-controlled companies). They also concluded that the positive effect of the development of institutions and cash holding is more prominent for non-government-controlled companies. Hall et al [3] showed that the transactional motivation, cautionary motivation and speculation motivation, there are three major motivations for cash holding. Transactional motivation is defined a motivation for holding cash.

Cautionary motivation means overcome the lack of liquidity risks and take advantage of business opportunities and avoid bankruptcy. Speculation motivation refer also to the company's cash holdings to take advantage of future unexpectedly investment opportunities, when external financing is costly. Lau et al. [5] found that companies have a higher level of asymmetry, hold less cash. Zhenxu [11] with investigating the effect of diversification on firm cash holdings in the New York Stock Exchange showed that the value of cash held by one-section companies is more than firms with several sections, and this negative relation is also in financial limited companies and other firms. His study also showed that the strategy of diversifying has a negative impact on cash holdings in companies with poor corporate governance mechanisms.

Sun et al [9] in the study as earning quality and the level of firm cash holding found that poor quality of earning has a negative effect on the company's cash assets and on the other hand has a positive effect on the level of the cash reserve. They also found that the negative impact of earning quality does ineffective positive effect of the excess cash on value of the company. According to their studying, reserves of cash held by US companies have increased importantly for the last two decades [2]. Thus, according to the findings of Qian Sun and his colleagues the companies with good earnings quality want to hold the less cash remained compared to companies with poor earnings quality. Garcia et al [2] showed that firms with high accruals quality compared to companies with low accruals quality hold lower levels of cash.

Their findings also showed that increasing in bank debt make an increased cash balance as well as firms with higher cash flow, shall hold more cash. In a study by the Sepasy et al [8] have shown that with increasing the inflation, the cash held by business units decreases and when inflation reaches a certain level, the amount of firm's cash holding increases with rising inflation. Also when operating cycle increases, the cash holding of units is reduced, however, when the operational cycle reaches a certain level, the company cash holding does not change.

Malekian et al [6] examined the determinants of the amount of cash and their results showed that there is a negative relationship between size of the company, tangible fixed assets and leverage with the cash holding. The results also showed that cash flow, profitability and growth opportunities have positively related to cash holding. Rasaiyan et al [7] examined the impact of internal regulatory mechanisms of corporate governance on the cash holding. The results showed that there is a negative and significant relationship between percentage of outside board members and the level of cash holding in exchange and there is a significant relationship between institutional investors and cash holding.

3 The Proposed Methodology

The study is a kind of applied and its design is quasi-experimental and has done using the ex-post facto approach. Also, the nature of the data used to test the hypothesis is the type of panel data. In order to gather the information needed, library method was used and research data was collected from the data of the selected companies referring to financial statements and explanatory notes and using Rahavarde Novin and TadbirPardaz software. According to the literature and to achieve the goal of our research, the following hypothesis is suggested:

First hypothesis: inflation influences on cash holdings.

Second hypothesis: the operational cycle influences on cash holding.

Third hypothesis: inflation through the operating cycle influences on cash holding.

3.1 The Statically Population and Sample Selection

In this study, statically population consisted of all companies listed on Tehran Stock Exchange from 2010 to 2014 and in determining sample, firms with the following conditions excluded:

1. Companies that inter the bourse in the time domain of this Research.
2. Companies that exit the bourse in the time domain of this research.
3. Companies that change their fiscal year in the time domain of this research.
4. Companies that was in the investment and financial intermediary groups.
5. Companies that in the time domain of this research have trading interval more than 6 months.
6. Companies that have their fiscal year does not end on 29/12.

With respect to paragraphs 1 through 6, 103 firms and 515 data-years are calculated to test the statistical hypothesis.

3.2 The Models

In the research to examine the first hypothesis is used of the regression model (1):

$$CASH_{it} = \beta_0 + \beta P_{1it} + \varepsilon_{it} \quad (1)$$

Where:

$CASH_{it}$: Cash holding firm i in period t

P_{it}: Inflation metrics firm i in period t

ε_{it}: Model estimation error

Replacing the inflation criteria in the model (1), model (2) is provided:

$$CASH_{it} = \beta_0 + \beta_1 PTOLID_{it} + \beta_2 PMASRAF_{it} + \beta_3 PGDP_{it} + \varepsilon_{it} \quad (2)$$

To test the second hypothesis regression model (3) is used:

$$CASH_{it} = \beta_0 + \beta OP_{it} + \varepsilon_{it} \quad (3)$$

Where:

OP_{it}: Criteria of the company's operating cycle i in period t

Putting the operating cycle parameters in the model (3), model (4) is provided:

$$CASH_{it} = \beta_0 + \beta_1 OP1_{it} + \beta_1 OP2_{it} + \varepsilon_{it} \quad (4)$$

$OP1_{it}$: The period of repayment of receivable accounts of firm i in period t

$OP2_{it}$: Period of inventory turnover form firm i in period t

To examine the third hypothesis, the regression model (5) is used:

$$CASH_{1it} = \beta_0 + \beta . P . OP_{it} + \varepsilon_{it} \quad (5)$$

Replacing the inflation criteria and the operational cycle in model (5), models (6), (7), (8) and (9) are provided:

$$CASH_{it} = \beta_0 + \beta_1 PGDP * OPDOR_{it} + \varepsilon_{it} \quad (6)$$

$$CASH_{it} = \beta_0 + \beta_1 PGDP * OPBAZPAR_{it} + \varepsilon_{it} \quad (7)$$

$$CASH_{it} = \beta_0 + \beta_1 PMASRAF * OPBAZPAR_{it} + \varepsilon_{it} \quad (8)$$

$$CASH_{it} = \beta_0 + \beta_1 PMASRAF * OPDOR_{it} + \varepsilon_{it} \quad (9)$$

Where:

$PGDP * OPDOR_{it}$: The product of the operating cycle of inventory turnover period on index of gross domestic product of firmi in period t

$PGDP * OPBAZPAR_{it}$:The product of the operating cycle of receivable accounts on the GDP indicator of firm i in period t

$PMASRAF * OPBAZPAR_{it}$: The product of the operating cycle of receivable accounts period on the consumer price index of firm i in period t

$PMASRAF * OPDOR_{it}$: The product of the operating cycle of inventory turnover period on the consumer price Index of firm i at period t

3.3 The Dependent Variable

Cash holding: The amount of cash is equal to cash and its equivalent divided by net assets that are extracted through the company's financial statements (balance sheet).

3.4 Independent Variables

1) Inflation: that is extracted from the site of Central Bank.

2) Operating cycle: that in the study has decomposed to period of inventory turnover and repayment period of receivable accounts.

A: Period of inventory turnover calculated by equation (10):

$$\text{period of inventory turnover} = \left(\frac{\text{operational costs}}{\text{Average net inventory}} \times 365\right) \times 1000 \quad (10)$$

B: The repayment period of receivable accounts calculated from the equation (11):

$$\text{repayment period of receivable accounts} = \left(\frac{\text{Initial operational revenues}}{\text{Average reciving accounts}} \times 365\right) \times 1000 \quad (11)$$

4 Implementations and Findings

Analysis and hypothesis testing was conducted using the software Eviews. Depending on the type of data and statistical analysis methods is used of multiple regressions based on panel data.

4.1 Descriptive Statics

Table 1 provides some concepts of descriptive statistics of variables. Also, the main central index is average which represents the balance and centre of distribution and for variable cash holding is equal 0. 070994. Another central characteristic is Median that half of the data is less than this value and half are greater and it is equal0.070020for variable cash holding. In general, scattering parameters are criteria for determining the scattering of each other or their extent of scattering toward average, which of the most important scattering parameters is the standard deviation which is equal 0.026937 for variable cash holding.

The asymmetry of the frequency curve is called skewness. If the coefficient of skewness be zero, the community is completely symmetric and if the coefficient be positive have right skewness and if the coefficient be negative have left skewness. The coefficient of skewness for cash holding is positive and near to zero, which indicates a normal distribution and skewness is very low to the right. If the kurtosis be zero i.e. the frequency curve in terms of kurtosis is in balance and normal situation, if this value be positive, the curve flattened and if it is negative the curve is outstanding which kurtosis is positive for all variables; Jack-Bera test for variable cash holding is 0.625447, which represents the normal distribution and normal levels of significance for this variable is more than 5% for cash holding variable, indicating that the dependent variables are normal. Finally, the observations for all variables are 515.

Table 1: Descriptive statistics of variables

Symbol	CASH	PGDP	PTOLID	PMASRAF	OP	OPBAZPARDAKHT
Variables	Cash holding	gross domestic product	Production price	Consumer price	Operating cycle of inventory turnover period	Operational cycle of repayment period of receivable accounts
Average	0.070994	34.98750	249.7451	20697730	1.136342	2.291888
Median	0.070020	31.66200	211.4100	2028065	0.000000	0.000000
Maximum	0.137678	102.6900	485.2500	2171578	43.69307	40.52796
Minimum	0.000326	1.000000	178.1100	2028065	-35.12833	-38.59670
Standard deviation	0.026937	22.35736	69.54531	5684.33	13.96311	13.63561
Skewness	-0.02968	0.613339	0.772053	0.928230	0.131638	0.127391
Kurtosis	2.839874	2.844795	2.199442	2.245350	2.755871	3.201409
Jark-Bera statics	0.625447	32.80611	64.91864	86.17536	2.766263	2.263412
Significant level	0.735314	0.000000	0.000000	0.000000	0.250790	0.322483
observations	515	515	515	515	515	515

Continue of Table 1: Descriptive statistics of variables

Symbol	PGDP*OPDOR	PGDP*OPBAZPAR	PMASRAF*OPBAZPAR	PMASRAF*OPDOR
Average	2.60E+08	181E+08	2301.240	3406.517
Median	0.000000	0.00000	0.00000	0.00000
Maximum	4.37E+10	5.68E+10	797142.8	573366.3
Minimum	-1.43E+10	3.75-E+09	-93938.26	-83097.00
Standard deviation	2.89E+09	3.75E+09	36696.52	34009.93
Skewness	12.18968	19.00534	19.94250	12.63433
Kurtosis	179.1006	395.1663	429.8716	189.3365
Jark-Bera statics	687207.6	3331176	3944260	758762.0
Significant level	0.00000	0.000000	0.000000	0.000000
observations	515	515	515	515

Source: Research Findings

4.2 Reliability Test

Reliability test of variables has done with the Fisher-ADF test and the results of other variables are similar to Table 2.

Table 2: Reliability test results

Variable	F-Statics	F-probability	F-Statics	F-probability
GDP indicator	304.416	0.00000		
Product Price Index	187.419	0.8190	288.508	0.0035
Consumer Price Index	117.354	1.00000	467.927	0.0000
Operating cycle of inventory turnover period	382.980	0.00000		
Operating cycle of Receive period of receivable accounts	368.272	0.00000		
Cash holding	350.468	0.00000		
Operating cycle of inventory turnover period * GDP indicator	632.804	0.00000		
Operating cycle of Receive period of receivable accounts * GDP indicator	462.548	0.00000		
Operating cycle of Receive period of receivable accounts * Consumer Price Index	590.507	0.0000		
Operating cycle of inventory turnover period * Consumer Price Index	670.303	0.00000		
Co-integration test		Variable	F-statics	F-probability
		Error sent.	356.369	0.0000

Source: research findings

In Table 2, all variables except for the variables Producer Price Index and Consumer Price Index have value of P-Value in unit root test less than 5% and it shows that they are zero order and in the stationary (steady) level and variables Producer Price Index and Consumer Price Index become reliable with once differencing.

On the other hand, if the variables have a regression in degree of different integration there is a possible for spurious regression of estimation that for this purpose and insurance of not being pseudo of regression was used co-integration test in the model. For this, it is enough after estimating the regression, reliability test was carried out on the regression disturbing component.

If the result of this test indicates being zero of the disturbing component, then can be figure on not being pseudo of regression and interpret its results. Otherwise regression is pseudo and the results are

not reliable and cannot be interpreted.

Therefore, in this study, along with the model, co-integration test is also performed to ensure the regression is not pseudo.

4.3 F-Limmer test and Hausman Test

F-Limmer and Hausman test results are as Table 3 and 4.

Table 3: F-Limer test (Chow)

Hypotheses		Kind of test	F-limer statics	Test probability
The main first hypothesis		F-limer	4.646144	0.0000
The main second hypothesis		F-limer	4.458472	0.0000
The main third hypothesis	Model (1)	F-limer	4.515704	0.0000
	Model (2)	F-limer	4.528969	0.0000
	Model (3)	F-limer	4.543183	0.0000
	Model (4)	F-limer	384.586654	0.0000

Source: research findings

In Table 3, the Pool probability of model data according to the hypothesis is zero and this hypothesis is not rejected and the alternative hypothesis is accepted being the data panel.

So for given type of model data in the next stage, fixed or random effects of company data, Hausman test is done which is shown in Table 4.

Table 4: Hausman test

Hypotheses		Kind of test	chi-square test	Test probability
The main first hypothesis		Hausman	0.00000	1.0000
The main second hypothesis		Hausman	1.189503	0.5517
The main third hypothesis	Model (1)	Hausman	1.656638	0.1981
	Model (2)	Hausman	0.020870	0.3372
	Model (3)	Hausman	0.742937	0.3887
	Model (4)	Hausman	0.068318	0.7938

Table 4 shows that the probability of the chi-square test of the main first and second and third hypothesis is higher than 5%, so the hypothesis H1 (fixed effects model) is rejected, it means there is no relationship between the estimated regression error and independent variables.

According to Hausman test the best method for parameter estimation and model of the main first, second and third hypothesis is random effects model.

5 Further Analysis on Hypotheses

Here some further analyses are presented on the hypotheses.

5.1 The Analysis of the First Hypothesis

The results of the test the first hypothesis is presented in Table 5:

Table 5: The estimation results of first hypothesis model coefficients

Model	Estimated coefficient	t-statics	p-value	F-statics	p-value	Adjusted coefficient of determination
y-Interception	0.171027	4.423998	0.0000	4.549661	0.0000000	0.420332
Product Price Index	-8.94E-06	-0.541035	0.5888			
Consumer Price Index	-4.36E-08	-2.507789	0.0125			
Price Adjusting Index	-0.000218	-1.981718	0.0482			

In Table 5, constant coefficients and coefficients of the variables Price Adjusting Index and Consumer Price Index to cash holding level in cash is significant at the 5% and estimated t-statistic for the variables Price Adjusting Index and Consumer Price Index to cash holding is -2.981718 and -2.507789 respectively, that are significant.

Thus, there is a linear relationship between the variables Price Adjusting Index and Consumer Price Index to cash holding. So one can conclude that there is a significant relationship between inflation and the level of cash holding, and t-probability for variable Product Price Index to the cash holding is more than 5 percent, and then is not so meaningful and with reliability of 95 percent, this variable is not significant. Adjusted coefficient of determination shows the explanatory power of the independent variables which could explain 42 percent of independent variable changes.

F-statistics probability indicates that the model is significant statically and the high value of Fisher statistics (F) indicates that there is a strong relationship between the variables in this model.

According to the hypothesis, because variables such as the price adjusting index and consumer price index to cash holding are significant in the model, so H0 is rejected, it means that there is a relationship between inflation and the level of cash holding.

5.2 The Analysis of the Second Hypothesis

The results of the second hypothesis are presented in Table 6.

Table 6: The estimation results of second hypothesis coefficients

Variable	Estimated coefficient	t-statics	P-value	t-statics	P-value
y-Interception	0.070810	76.58795	0.00000	4.576127	0.00000
repayment period of receivable accounts	0.000200	2.005238	0.0456	Adjusted determination coefficient	
Period of inventory	-0.000242	-2.398881	0.0169	0.419810	

In Table 6, constant coefficient and variable coefficients such as operating cycle (repayment period of receivable accounts and inventory turnover period) to cash holding is in significance level of 5% and t-statistics for these variables is 2.005238 and -2.398881 respectively, which are significant.

Thus, there is a linear relationship between the variables of operating cycle (repayment period of receivable accounts and inventory turnover period) to cash holding and it can be concluded that there is a relationship between operating cycle and cash holding.

Adjusted determination coefficient shows the explanatory power of the independent variables and could explain 42 percent of dependent variable changes F-statistics probability indicates that the model is significant statically and the high value of Fisher statistics (F) indicate that there is a strong relationship between the variables in this model.

Table 7: The estimation results of third hypothesis coefficients

Model	Variable	Estimated coefficient	t-statics	p-value	F-statics	p-value	Adjusted determination coefficient
Model 1	β_0	0.071071	36.79815	0.0000			
	$PGDP * OPDOR_{it}$	-2.95E-13	-0.865380	0.3872	0.747925	0.387538	0.001456
Model 2	β_0	0.071031	36.59377	0.0000			
	$PGDP * OPBAZPAR_{it}$	-1.61E-08	-0.595178	0.5520	0.354415	0.551887	0.000690
Model 3	β_0	0.071031	36.59377	0.0000			
	$PMASRAF * OPBAZPAR_{it}$	-1.61E-08	-0.595187	0.5520	0.354415	551887.0	000690.0
Model 4	β_0	36.37219	36.37219	0.0000			
	$PMASRAF * OPDOR_{it}$	6.34E-09	0.2218071	0.8275	0.047642	827306.0	000093.0

5.3 The Analysis of the Third Hypothesis

The results of the third hypothesis test are presented in Table 7. In Table 7, the t-probability, the coefficients of the variables mediating role of operating cycle on inflation than cash holding is more than 5%, so statistically is not significant, and H0 is accepted, it means between the role of intermediaries operating cycle of the relationship between inflation and cash holding there is no any relation.

6 Discussion and Conclusion

The aim of this study was to investigate the effect of inflation on cash holding and operating cycle of the company, in the period 2010 to 2014 in Tehran Stock Exchange. After designing and testing the hypothesis that for each hypothesis was done, it was concluded that inflation and operating cycle have no significant impact on cash holding and the results indicate no significant impact of inflation through the operating cycle on cash holding. Based on existing theoretical foundation, results can be justified so long as the cash conversion cycle requires costly foreign funds. Thus, by reducing the time of cash involvement with working capital, the company may have better performance.

The cash conversion cycle will be shorter by reducing the inventory conversion period through processing and selling faster goods, or by reducing the duration of the collection of receivable accounts by speeding up collections or by increasing the deferral period payable by slowing down payments to suppliers. On the other hand, the existence of information asymmetry due to the low quality of accounting information increases the cost of capital and the provision of funds from financial markets will not be favour of the company; therefore, companies prefer hold more liquid assets until in the necessary can finance their requirements funds from domestic sources. It should be noted that keeping more cash may be due to warily behaviour of Iranian managers being regardless of the quality of accounting information. The results also suggested that at the macro level, companies have to adjust and optimize cash holding strategy in response to the changes in purchasing power due to inflation. Due to the impact of inflation on cash holding, i.e. affecting the economy structure of a country in determining the balance of cash companies, so it is recommended that managers and investors pay more attention to macroeconomic factors such as inflation rate, and use them in rational decision. Also according to the operating cycle as one of the factors affecting the level of cash holding; so that during the operating cycle by operating assets and working capital management lead to changes in the level of cash holding, so company executives are recommended to continue to their economic situation, keep in balance the operating assets and working capital, thereby reduce their opportunity costs; and thus create the favourable conditions for investment.

Wang et al. [10] concluded that the there is a significant and negative correlation between consumer price index and the level of cash holding, but this relationship with reaching the consumer price index to a specified level become reverse. It means that by increasing the general level of prices, because of losses from holding monetary items, the amount of cash held by the company decreased, but at a certain level of inflation, corporates increase their cash in order to avoid bankruptcy that in some ways is consistent with our results. Benjamin Yeboah and Kwaku [1], showed that the period of collection of receivables, cash conversion cycle, capital structure and size of banks has a negative and significant relationship with the cash statue of banks. While, the payment of creditors and profitability

has a positive and significant relationship with cash statue of banks which in some ways is consistent with the results of this study. Doing any research opens the new ways to new research. So topics for future research is recommended, which examines the relationship between inflation and operational cycle with cash holding in recession and boom market, examines the relationship between inflation and operating cycle and financial flexibility and examines the relationship between inflation and operating cycle with unexpected earnings per stock.

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