Assessing Asymmetrical Relationship between Cash Flow Sensitivity and Operating Cash Flow

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ABSTRACT: Economic institutions mostly hold their assets in the cash accounts. The present study mainly aims to assess the asymmetrical relationship between cash flow sensitivity of cash (changes at the level of cash holdings in proportion to changes in cash flows) and operating cash flow sign. Furthermore, the effect of fiscal restraints is appraised in this research. Multiple linear regression models were applied to analyze 148 companies over the 2007- 2012 period. The obtained findings indicated an asymmetrical relationship between cash flow sensitivity of cash and positive or negative cash flows. Simply put, there is a significant difference between cash flow sensitivity of cash and positive or negative cash flow. The results also showed that fiscal restraints are not significantly influential in cash flow sensitivity of cash.
Key words: Asymmetric cash flow, Fiscal constraint, sensitivity of cash

INTRODUCTION

Recently, more attention has been paid to the issues of firms' cash holdings and their effective elements. Precautionary motive of keeping the cash holdings proves that firms are required of cash holdings in order to financially provide new investments and pay back matured liabilities (Bao et al., 2012). As a matter of fact, cash holdings avoid unreasonable costs with financing when confronting shortcomings in firm's liquidity. Almeida et al. (2004) posited a new model based on which they hypothesized that financially constrained firms have a positive cash flow sensitivity of cash, while unconstrained firms' cash savings should not be systematically related to cash flows. They investigated the effect of financial constraints by the firm's propensity to save cash out of cash flows (the cash flow sensitivity of cash). Riddick and Whited (2009) theoretically and experientially found that saving and cash flow are negatively related. Bao et al. (2012) supported the hypothesis that firms have different levels of responses to their cash holdings when facing positive and negative cash flows. Possibility of cash flow paucity is different due to the level of cash holdings (Fualkender and Wang, 2006).

The current study intends to show asymmetric cash flow sensitivity of cash either cash flow is positive or negative. In other words, cash flow sensitivity of cash will be negative when facing a positive cash flow and it will be positive when facing a negative cash flow. Firms are also divided into financially constrained and unconstrained ones and appraised cash flow sensitivity of cash condition in both groups. Panel data analysis and regression method were applied to estimate the statistical model of the research. Target population was consisting of 148 listed companies on Tehran Stock Exchange over the 2006 to 2011 period. The results were consistent with the main hypothesis and affirmed asymmetrical relationship between cash flow sensitivity of cash and positive or negative cash flows, and a cash flow sensitivity of cash is negative when being confronted with a positive cash flow and vice versa. Moreover, the findings demonstrated no significant association between fiscal restraints and cash flow sensitivity of cash.

Hossein Pour (2005) found that there is a positive relationship between size, value added, firm's dividend and cash flow sensitivity of cash, and there is a negative relationship between firm's background and cash flow sensitivity of cash.

Aghaei et al. (2009) enumerated and prioritized several elements which had negative effects on cash holdings as follows: receivable accounts, net working capital, inventory of merchandise, and short-term liabilities. On the other hand, opportunities of firm development, dividend, fluctuations in cash flows and net profit are noticed as positive elements. They could not find long-term liabilities and firm size considerable enough to be accepted as negatively effective elements in cash holdings.

Akbari and Mohammadi (2013) studied on the effects of leverages ratio on systematic risk. The aim of this study is to determine if there is any significant relationship between Leverages ratio (Operating leverage, financial leverage, Compound Leverage) as independent variables and Systematic risk (Beta) as dependent variables. To do so 115 companies accepted in Tehran Stock Market were selected based on screening (systematic deletion) in an eight-year- period between "2005-2012". The results of the study revealed that there is not significant relationship between the variables.

Boromand et al. (2013) investigated the relation between systematic risk and stock return. The results were indicative of positive and significant relation between historical and future risk of individual stocks and portfolio related to those companies active in Tehran Stock Exchange, during different time scales.

Kashani Pour and Naghi Nezhad (2009) conducted a research in which cash flows did not have any significant influence on the levels of cash holdings and no significant difference was seen between cash flow sensitivity of cash and financially constrained and unconstrained firms. They believed that cash flow sensitivity of investment can be considered more appropriate than cash flow sensitivity of cash in order to determine fiscal restraints.

According to Kashani Pour et al. (2010) financially constrained firms experience higher cash flow sensitivity of investment and focus on internal cash flows when making decision to invest.

Arab Salehi and Ashrafi (2011) stated that cash holdings can positively affect firms to decrease the level of cash flow sensitivity of investment.

Mahdavi and Panahian (2012) demonstrated that accounting conservatism and liquidity indexes are negatively related to each other. They also mentioned that there is a highly significant relationship between accounting conservatism and liquidity indexes in financially flexible firms.

Almeida et al. (2004) conducted a research entitled 'the cash flow sensitivity of cash' in which they modeled a firm's demand for liquidity to develop a new test of the effect of financial constraints on corporate policies. They compared the empirical sensitivity of investment to cash flow across groups of firms. They utilized empirical and theoretical analyses and proved that cash flow sensitivity of cash can be regarded as an appropriate criterion to recognize financial constraints.

Subramaniam et al. (2010) analyzed whether the organizational structure of firms affects their cash holdings. They found that diversified firms hold significantly less cash than their focused counterparts. They could also attribute the lower cash holdings among diversified firms to complementary growth opportunities across the different segments of these firms and the availability of active internal capital markets. They also proved that the other theories which rely on the potentially effective use of asset sales of non-core segments of diversified firms to generate cash, and the increased agency/influence costs in diversified firms do not offer an economically significant explanation for the lower cash holdings among diversified firms.

Kim (2011) reviewed the effect of keeping liquidity and financial limitations on the cash flow sensitivity of investment. He showed that financially constrained firms are accompanied with high level of cash flow sensitivity of investment, and there is a close association between cash holdings and cash flow sensitivity of investment. The findings of his study indicated that firm's liquidity and cash flow sensitivity of investment are negatively related to each other, providing firm's investments are supplied by internal resources.

Bao et al. (2012) assessed asymmetric cash flow sensitivity of cash holdings. They concluded that the cash flow sensitivity of cash is negative when a firm faces a positive cash flow environment, but it is positive when a firm faces negative cash flows. They further divided firms into financially constrained and unconstrained ones and found that the cash flow sensitivity of cash asymmetry continues to hold in both groups.

Francis et al. (2013) investigated how firms' corporate governance influences financing constraints. Utilizing firm-level corporate governance rankings across 14 emerging markets, they found that better corporate governance lowers the dependence of emerging market firms on internally generated cash flows and reduced financing constraints that would otherwise distort efficient allocation of investment and destroy firm value. Additionally and more importantly, firm-level corporate governance matters more significantly in countries with weaker country-level governance. Their results suggest substitutability between firm-specific and country-level governance in determining a firm's investment sensitivity to internal cash flows.

MATERIALS AND METHODS

Regression and correlation analysis were applied in this study to assess the relationship between dependent and independent variables. Archival data and desk method were used, and the following questions are intended to be answered according to the statement of the problem and review of literature.

Is there a significant difference in the cash flow sensitivity of the firms with positive or negative cash flows?

Is there an asymmetric relationship between cash flow sensitivity and cash flow sign in financially constrained firms?

The following hypotheses have been designed to answer the aforementioned questions:

First hypothesis: There is a significant difference in the cash flow sensitivity of the firms with positive or negative cash flows.

Second hypothesis: In financially constrained firms, there is not asymmetric relationship between cash flow sensitivity and cash flow sign.

Target population of this research is consisting of all listed companies on Tehran stock exchange from 2007to 2012. Sampling was conducted considering the following criteria and applying systematic-elimination method:

1- Due to specific condition of reporting environment, investment companies, banks and financial intermediation institutions were eliminated from statistical sampling.

2- The company was uninterruptedly active on Tehran stock exchange and was never transferred to the informal panel.

3- The end of financial year was March, and no financial change happened during the process of researching.

4- Financial data were accessible of during the research period.

Owing to the aforementioned criteria, 148 companies were chosen as the research sample, and needed statistical tests were given.

Statistical model: The following model was designed on the basis of Bao, Chan and Zhang (2012) model in order to test the first hypothesis:

$$\Delta CashHoldings_{it} = \alpha_0 + \alpha_1 CashFlow_{it} + \alpha_2 Neg_{it} + \alpha_3 CashFlow_{it} * Neg_{it} + \alpha_4 Q_{it} + \alpha_5 Size_{it} + \alpha_6 Expenditure_{it} + \alpha_7 \Delta NCWC_{it} + \alpha_8 ShortDebt_{it-1} + \varepsilon_{it}$$

The following model was also designed based on Bao, Chan and Zhang (2012) model in order to test the second hypothesis:

$$\Delta CashHoldings_{it} = \beta_0 + \beta_1 CashFlow_{it} + \beta_2 Neg_{it} + \beta_3 CashFlow_{it} * Neg_{it} + \beta_4 Constraint_{it} + \beta_5 CashFlow_{it} * Constraint_{it} + \beta_6 Constraint_{it} * Neg_{it} + \beta_7 CashFlow_{it} * Constraint_{it} * Neg_{it} + \beta_8 Q_{it} + \alpha_5 Size_{it} + \alpha_6 Expenditure_{it} + \alpha_7 \Delta NCWC_{it} + \alpha_8 ShortDebt_{it-1} + \varepsilon_{it}$$

In which cash holding: cash holding / total assets

Cash holdingΔ: (cash holding at the end of the year – cash holding at the beginning of the year) / total assets

Cash flow: operating cash flow/ total assets

Neg: a dummy variable which equals (-1) for the firms with negative cash flow, and otherwise it will equal zero.

Q: (sum of capital market value and book value of assets – book value of capitals) / (book value of assets)

Size: Natural logarithm of total assets

Expenditure: capital costs / total assets

NCWC: net working capital without cash holding (working capital – cash holding)

NCWCΔ: (net working capital without cash holding at the end of the period) – (net working capital without cash holding at the beginning of the period)

Short Debt: current short-term liabilities / total assets

Constraints: a dummy variable which equals (1) for the financially constrained firms, and otherwise it will be zero.

Research variables

Independent variable: Operating cash flow sign: input operating cash flow of the firm stands for positive cash flow, and output operating cash flow stands for negative cash flow. In this research, a dummy variable was applied to indicate the sign of operating cash flow. It equals (-1) for the firms with negative cash flow, otherwise it will be zero.

Fiscal restraints: whether a firm is confronted with financial constraints or not is considered as another independent variable in this study, and dummy variable is employed to demonstrate firm's financial situation.

Fiscal restraints can be determined in the following manner:

If the company has not distributed cash dividend during the year't', it is considered as a financially constrained firm. If the firms are prioritized on the basis of book value of total assets, those firms which are located in the last quadrant are considered as financially constrained firms.

Dependent variable: Cash holding is regarded as the dependent variable of the research.

Control variables: Q_{tobin}, size, expenditure and short debt are considered as control variables in this study.

RESULTS

Descriptive statistics of the data: In the following table, mean, standard deviation, sleekness, kurtosis, and coefficient of changes are calculated.

First hypothesis testing: Based on Chow test, some breaks were found at specified breakpoints; therefore, using asymmetric panel data methods are needed. Hausman test was applied to evaluate parameters of appropriate estimator. Number of Chi-square statistics was about 7.15; comparing this number with critical values of the table indicates that random effects model is the most acceptable one to estimate the model.

Findings of the first hypothesis testing are shown in the table 2.

Considering variance analysis, p-value is less than 0.05 and the model is statistically significant. Coefficient

of determination indicates that the model is capable of explaining 31% of the dependent variable distributions.

Fitness of the model: Kolmogorov-Smirnov test (K-S=1.070 P=0.202) was applied to prove residuals standardization. Variance consistency was also confirmed. Durbin-Watson statistics (D-V=2.073634) show the lack of correlation between residuals. VIF is about 1 which shows lack of linearity in obtained data.

Second hypothesis testing: Based on Chow test, some breaks were found at specified breakpoints; therefore, using asymmetric panel data methods are needed. Hausman test was applied to evaluate parameters of appropriate estimator. Number of Chi-square statistics was about 10.48; comparing this number with critical values of the table indicates that random effects model is the most acceptable one to estimate the model. Findings of the second hypothesis testing are indicated in the table 3.

In the above model, coefficient of CONSTRAINT*CASHFLOW*NEG equals -4.00000053. Considering the amount of P-value, this coefficient is not statistically significant; therefore, null hypothesis, which shows there is not an asymmetric relationship between cash flow sensitivity of cash and cash flow sign in financially constrained firms, is not rejected.

Fitness of the model: Kolmogorov-Smirnov test (K-S=1.018 P=0.251) was applied to prove residuals standardization. Variance consistency was also confirmed. Durbin-Watson statistics (D-V=2.077129) show the lack of correlation between residuals. VIF is about 1 which shows lack of linearity in obtained data.

Table1. Descriptive statistics of research variable

Index	Mean	SD	Skewness	Kurtosis	Coefficient of changes
Cashholding	0.004	0.037	0.784	15.329	9.223
Cashflow	2844.613	44407.427	1.817	65.809	15.611
Neg	0.451	0.498	0.196	-1.966	1.103
Constraint	0.477	0.500	0.090	-1.996	1.047
Q_{tobin}	422269.306	752756.160	5.855	66.402	1.783
Size	896693.946	1978090.412	5.374	32.736	2.206
Expenditure	0.041	0.054	3.920	25.828	1.334
NCWC	0.025	0.267	-2.244	13.717	10.617
ShortDebt	0.592	0.237	1.721	11.390	0.401

Table2. Variance Analysis

Variable	R^2	Coefficient of independent variable	Sig.	Type of relation	Result
CASHFLOW	0.311759	-5.00000082	0.002	Reverse	Confirmed hypothesis
CASHFLOW*NEG		3.000000037	0.030	direct	

Table3. Variance Analysis

Variable	R2	Coefficient of independent variable	Sig.	Type of relation	Result
CASHFLOW	0.311759	3.00000009	0.0263	Reverse	Rejected hypothesis
CASHFLOW*NEG		2.00000041	0.0487	Direct	
CONSTRAINT*CASHFLOW*NEG		-4.00000053	0.3960	Not significant	

DISCUSSION

Target population of the research was comprised of 148 companies which were chosen among all listed companies on Tehran Stock Exchange. In was an applied research in which field operations and desk methods were used to collect data. Ex post facto methods were utilized in order to find correlation between the variables. The achieved findings of testing hypotheses indicated that first hypothesis is confirmed at the significance level of 5%, and second hypothesis is rejected. In other words, cash flow sensitivity of cash is different when facing a positive or negative cash flow, and firms' fiscal restraints do not significantly affect cash flow sensitivity of cash. Results of testing the first

hypothesis are in the same direction of the study which was conducted by Bao et al. (2012). Thus Bao's results can be generalized on Iran's firms. They stated that firms with positive cash flows can take advantage of more opportunities to invest. When a firm faces positive cash flow, it can avoid negative cash flow sensitivity of cash, but when the firm faces negative cash flow, it has to continue inappropriate transactions and keep more cash holdings. Furthermore, they found that there is an asymmetric relationship between cash flow sensitivity of cash and cash flows. In other words, cash flow sensitivity of cash will be negative when facing a positive cash flow and it will be positive when facing a negative cash flow. The obtained results of the

studies conducted by Kashani Pour and Naghi Nezhad (2009), Ezzedine and Salma (2007) are consistent with the second hypothesis testing.

Suggestions resulting from research findings
Considering the effects of operating cash flows on firms' funds and country's economic development, it can be concluded that firms are dependent upon their internal capitals and it is suggested that banks and financial institutions provide some facilities in order to decrease fiscal restraints in order to supply firms with funds and investments.

- It is also recommended that firms, shareholder activists, board of directors, auditing institutions and researchers become more familiar with theoretical background and review of fiscal restraints in order to decrease financial constraints and increase firm values.

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