

## The Impact of financial constraints resulted from liquid assets on asymmetric cash flow sensitivity

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**Abstract:** Increasing investment through development of operational cash flows is one of the main elements in increasing optimal productivity increase Cash amounts are decreasing risk of financial crisis and may be considered as a deposit to encounter unexpected losses. Accordingly, it is required to consider cash amounts deposits and sensitivity of asymmetric cash flow. Considering the importance of this issue, we tried to investigate the impact of external supervision on probable relation between financial constraints resulted from liquid assets and sensitivity of asymmetric cash flow. In this study, 138 listed companies (in Tehran Stock Exchange) were investigated from 2008 to 2013. Logistic regression model was employed to test the hypotheses. The results revealed that financial constraints resulted from liquid assets has positive impact on asymmetric cash flow sensitivity.

**Key words:** liquid assets, Financial Constraints; Asymmetric cash flow sensitivity

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### 1. Introduction

Liquid assets structure is one of the main decisions making mechanisms among managers which are employed to efficient usage of investment opportunities and acquiring optimum performance that had been widely investigated in theoretical literature and developed countries. Decision making procedures are fulfilled in different companies on the basis of their economic conditions, elements relating to competitive market and companies' long-term objectives (Riddick and Whited, 2009). Company's financial and economic conditions are directly relating to volume and amount of company cash flows (Acharia et al., 2007). Kaliri et al. (2007) concluded that increasing investment through development of operational cash flows is one of the main elements in increasing optimal productivity increase (Almeida et al., 2007). One of direct controls of institutional shareholder about various performed investments is controlling company's produced operational cash flows through external supervisors including regulations, stock exchange, auditing organization and other financial analysts (Fayolkenderand Yang, 2006). Considering importance of investment and as result of tender contracts, concealing undesired news and agency costs, a company may cancel inappropriate projects immediately after encountering negative cash flows. Accordingly, negative sensitivity of cash flows on the basis of liquid assets may occur only when company is facing positive cash flows. We conclude that if company encounters negative cash flows, there will be no necessity for existence of negative relation

between cash flows sensitivity and amount of liquidity. As capital market in Iran is underdeveloped.

### 2. Theoretical principles and literature review

Preserving liquid assets may prevent external financing at the time of liquidity crisis which result in extortionate costs. We suppose that there is an asymmetric relation between cash flows sensitivity and preservation of cash amounts. Such asymmetry may be resulted from various causes including binding projects, concealing undesirable news and agency costs. It will be demonstrated through employed variables that there is a negative relation between cash flows sensitivity and preservation of cash amounts when company is encountering positive cash flow. These results are in accordance with Riddick and whited (2009) findings. On the other hand, such sensitivity will be positive when the company is facing negative cash flow (Bao et al., 2010). We categorize companies in two different groups of companies with financial constraints and companies without financial constraints on the basis of four different criteria of WW index (Whited and Wu, 2006), dividend (Bao et al., 2012), size of the company (Arsalan et al., 2006; Azkan 7 Azkan, 2004) and company's adjusted point (Bao et al., 2012). It will be concluded that asymmetric cash flow sensitivity than cash holdings will exist in both mentioned groups. Companies with financial constraints comparing other companies are less susceptible of attracting investment in new projects and plans which are unprofitable; because external financing is very hard for such companies (Erickson and Whited, 2000). All results of this study revealed

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that companies may express various levels of reaction in opposing negative and positive cash flows. Accordingly, current study is trying to answer this question that is there any relation between asymmetric cash flow sensitivity, financial constraints and external supervision in companies which are listed in Tehran Stock Exchange?

Riddick and Whited (2014) reviewed companies' cash flow sensitivity comparing to amount of liquidity. They employed various experimental and theoretical models and find out that there is negative relation between changes of liquid assets and liquidity flow. Riddick and Whited firstly compared their results with results of Almeida et al. study. Firstly, their model was more realistic than the one employed by Almeida et al. because it could cover more capital depreciation ratio and shocks of liquidity flow. Secondly, Riddick and Whited declared that when explanatory variables have measuring error, it will be possible to change mark of other explanatory variables. They stated that liquidity flow sensitivity than cash equity may be positive when no adjustment had done for Q component (control variable in experimental model). After adjusting deviations resulted from Q measurement error through estimating GMM, the results revealed negative sensitivity of liquidity flow than liquidity. However, controlling variables such as size of company, capital expenses, noncash working capital and short-term debt are missed in Riddick and Whited model. Almeida et al. (2013) investigated impacts of commercial groups on performance of companies in India in order to study the relation between financial constraints and company's requests of liquidity for developing a new test to assess Lensing et al. (2003) financial constraints. They estimate probable investment by employing data of 694 Indian companies from 1997 to 1989 and revealed that investment sensitivity comparing cash flows was considerably low in commercial groups. It recommend that member of commercial groups may more appropriately access external amounts in comparison with other companies. Dicha et al. (2012) studied sensitivity of asymmetric cash flows in companies with and without financial constraints. They employed Riddick and whited model (2009) for cash flows sensitivity. They revealed that companies with negative cash flows have different cash flows sensitivity in comparison with companies with positive cash flows. This difference is same as asymmetric cash flows sensitivity. They also concluded that companies with financial constraints have more asymmetric cash flow sensitivity than companies without financial constraints. Harford, Keshk and Manesi (2012) investigated asymmetrical condition of cash holdings sensitivity in comparison with cash flow by reviewing an American producing company. The results of this study

revealed that cash flow sensitivity will be negative when a company is facing positive cash flow but this sensitivity will be positive when the company is opposing negative cash flow. Kalari et al. (2012) studied impacts of internal and external financial constraints on investment sensitivity comparing to cash flows. They recommended a model which indicated such sensitivity through reciprocal relation between earning and cost. As per cost effects, higher levels of investment require more suppositions, more costs and higher levels of risk which indicates a positive relation between cash flows and investment. On the other hand, according to earning effects, higher levels of investment will provide more income for the company and subsequently will decrease company's risk. This effect is indicating a negative relation between cash flows and investment.

Kolich (2014) studied the impacts of commercial groups on investment and decrease of financing constraints in Stock Exchange Market. He assessed impacts of joining commercial group on investment behavior and removal of financing constraints. According to this study, joining a commercial group will affect companies' investment behavior and removal of financing constraints. Kashanipour and Naghizadeh (2013) reviewed the impacts of financial constraints on adjustment of levels of cash holdings in comparison with adjustments of cash flows. Various criteria (size of company, lifetime of company, dividend per commercial group ratio) are employed as representatives of constraints to demonstrate that cash flows have significant impacts on different levels of cash holdings and that there is no significant difference between cash flow sensitivity of companies with financial constraints and the ones without financial constraints. Tehraniand and Hesarzadeh (2012) investigated impacts of free cash flows and financing constraints on investment levels of 120 companies which had listed in Tehran Stock Exchange from 2000 to 2006. Results of this study revealed that there is a direct and significant relation between free cash flows and levels of investment.

### 3. The hypothesis and research conceptual model

Meditating on the researches done in the world, the following hypotheses have been made for answering the raised questions and reaching the research aims:

"Financial constraints which had resulted from liquid assets affecting asymmetric cash flow sensitivity".

The model employed in this study had taken from Almeida et al. (2004) study and adjusted variables of Bao et al. (2014) research which is as follows:

$$\Delta CashHoldin_{i,t} = \alpha_0 + \beta_1 CH_{i,t} * Cons_{i,t} + \beta_2 Q_{i,t} + \beta_3 Size_{i,t} + \beta_4 Exp_{i,t} + \beta_5 Acq_{i,t} + \beta_6 \Delta Ncwc_{i,t} + \beta_7 ShortDebt_{i,t} + \varepsilon_{i,t}$$

#### 4. Methodology

This is a correlative applied study. As historical information is employed in testing its hypotheses, this may be categorized in quasi experimental studies. Moreover, current study can be concluded as experimental research with inductive reasoning system while it's a field-library study which employed historical data in causal comparative method.

#### 5. Research variables and method of measurement

Research variables are categorized in three different groups on the basis of their role in this study:

- Dependent or affected variables
- Independent or affecting variables
- Control variables

$$\text{Asymmetric Cash Flows Sensitivity} = \left| \frac{\text{Cash flow sensitivity of current year} - \text{cash flow sensitivity of past year}}{\text{Total Assets}} \right|$$

Moreover, cash flow sensitivity is measured through following model:

$$\text{SenCF}_{i,t} = CF * \text{Neg}$$

That

$\text{SenCF}_{i,t}$  = cash flow sensitivity

$\text{CF}_{i,t}$  = cash flow ratio which is calculated as follows:

$$\text{cash flows ratio} = \left( \frac{\text{operating cash flows}}{\text{total assets value}} \right)$$

$\text{Neg}$  = artificial variable of negative cash flows that is equal to 1 if the company had negative cash flow otherwise it is equal to zero.

$$\begin{aligned} \text{WW index}_{i,t} = & -0.091 \text{CashFlow}_{i,t} - 0.062 \text{DIVPOS}_{i,t} + 0.021 \text{TLTD}_{i,t} - 0.044 \text{Size}_{i,t} \\ & + 0.102 \text{ISG}_{i,t} - 0.035 \text{SG}_{i,t} \end{aligned}$$

$\text{Cash Flow}_{i,t}$  = cash flows that had calculated through dividing net cash flows of operational activities on total value of company's assets in company i at the end of year t as follows:

$$\text{Cash Flows} = \left( \frac{\text{cash flows resulted from operational activities}}{\text{Total value of assets}} \right)$$

$\text{DIVPOS}_{i,t}$  = artificial variable that will be equal to 1 if the i company pay cash dividend during year t; otherwise it will be equal to zero.

$\text{TLTD}_{i,t}$  = ration of long-term debts on value of total assets.

$$\text{long term debts ratio} = \left( \frac{\text{long term debts}}{\text{Total value of assets}} \right)$$

$\text{Size}_{i,t}$  = natural logarithm of book value of total assets.

$\text{ISG}_{i,t}$  = rate of selling investigated industries which is calculated as follows:

$$\text{Industry Sale Growth} = \left( \frac{\text{sales in current year} - \text{sales in past year}}{\text{sales in past year}} \right)$$

$(\text{SG}_{i,t})$  = rate of company's sales that according to Becker et al. (1998), Chung and Kalapour (2003),

As impacts of external supervision on financial constraints resulted from liquid assets and asymmetric cash flow sensitivity are investigated in this study, asymmetric cash flow sensitivity as dependent variable while external supervision in first model and financial constraints resulted from liquid assets are considered as dependent variables. Control variables of this study are as follows: size of the company, Tobin's Q index, capital expenses ratio, share acquisition, noncash working capital ratio, short term debts ratio.

#### 5.1. Dependent variable

Asymmetric cash flow sensitivity is dependent variable of this study which is affecting relations between capital budgeting variable and other variables (Modhani, 2008). Asymmetric cash flow sensitivity is calculated as follows:

#### 5.2. Independent variables

##### 5.2.1. Financial Constraints

Financial constraints resulted from liquid assets is dependent variable of current study which had measured through liquid assets and on the basis of Whited and Wu (2006) studies. Hereinafter, this variable will be called WW. Comparing Kaplan and Zingales (1997) index, this index is much more compatible with features of companies' financial constraints. WW index was compiled as follows:

Reynolds and Francis (2000) and Moore (2006), is employed as an index for value of growth opportunity which is calculated as follows:

$$\text{company's sale growth} = \left( \frac{\text{current year's sales} - \text{past year's sales}}{\text{past year's sales}} \right)$$

By calculating variables and putting them in above model, companies were measured and categorized on the basis of WW index in each fiscal year. Therefore, companies that their size is less than medium WW index of all sample companies will be categorized as companies with financial constraints; otherwise will be categorized as companies without financial constraints.

#### 5.3. Control variables

Control variables of this study are as follows:

Size of Company: natural logarithm of book value of total assets.

**5.3.1. Tobin's Q ratio**

Tobin's Q index is one of the control variables which are used for measuring Lan and Polson Model (1989).

**5.3.2. Capital expenditures ratio**

Capital expenditures are the expenses of preserving or increasing production and service capacity and will cause profitability for the company. These expenditures are mainly for purchasing, constructing, optimizing and repairing fixed assets. This study follows Whited and Wu (2006) research for calculating capital expenditures as follows:

$$\text{CapitalExpenditureRatio} = \left| \frac{\text{currentyear'sassets} - \text{pastyear'sassets}}{\text{totalassets}} \right|$$

**5.3.3. Shares acquisition**

Batis et al. (2009) provided evidences on increase of capital expenditures in companies with surplus cash flows and their excessive motivation to acquire share of other companies even when they have very weak investment opportunities (low Tobin's Q ratio) (Erickson and Whited, 2000). Share acquisition variable was employed in this study as share acquisition may result in decrease of liquid assets. This was considered as control variable in related model (Koliri et al., 2007). Share acquisition is an artificial variable that will equal 1 if the company seeks to acquire share of other companies and otherwise it will be equal to zero (Fayolkender and Yang, 2006).

**5.3.4. Noncash working net capital ratio**

Working capital is one of the most important assets of every commercial institute which had considerable role in their financial decisions. In this study,  $NCWC_t$  is a substitute for liquidity. Therefore,  $\Delta NCWC_{i,t}$  will be employed to control impacts of net capital (Bao et al., 2012). Net noncash working capital shall be calculated as follows (Bao et al., 2012):

Net working capital = current assets – current debts

Net noncash working capital = net working capital – cash amount

Net noncash working capital ratio

$$= \left| \frac{\text{Net noncash working capital}}{\text{Totalassets}} \right|$$

Changes of noncash working capital = noncash working capital of current year – noncash working capital of past year

**5.3.5. Short term debts ratio**

Opening short term debts reflect probability of liquidity analysis during the year or may reduce the liquidity and motivate the managers to store more liquidity. Accordingly, short term debt variable was considered as a control variable (Fayolkender and Yang, 2006). Short term debts ration at the beginning of fiscal year was calculated as follows (Acharia et al., 2007):

$$\text{Shorttermdebtsratio} = \left| \frac{\text{Shorttermdebts}}{\text{Totalassets}} \right|$$

**6. Results**

**6.1. Descriptive statistics**

Hereunder are results of 828 year-company descriptive statistics of studied samples.

**Table 1:** Descriptive statistics' results

Average	Mean	Maximum	Minimum	Standard Deviation	Skewness	Kurtosis
13.554	13.342	18.817	10.081	1.500	0.866	4.289
1.477	1.242	7.159	0.564	0.750	3.234	5.117
0.155	0.045	7.568	-0.843	0.518	7.071	6.611
0.071	0.088	0.809	-1.321	0.259	-2.491	4.213
0.541	0.532	0.978	0.076	0.248	3.284	6.451
Company with asymmetric cash flow sensitivity				74 observations 8.9%		
Company without asymmetric cash flow sensitivity				754 observations 91.1 %		
Company with financial constraints resulted from cash liquidities				427 observations 51.6 %		
Company without financial constraints resulted from cash liquidities				401 observations 48.4%		
Company with share acquisition				732 observations 88.4%		
Company without share acquisition				96 observations 11.6%		

Above measures may be categorized as central, variability and other measures. Central measures are average and mean while variability measures include standard deviation. Other measures are minimum, maximum, skewness and kurtosis.

**6.2. Test of normality**

The first stage of assessing hypotheses is testing the normality of gathered data. Following hypotheses were compiled to assess normality of data.

H0: data are normally distributed.

H1: data are not normally distributed.

Kolmogorov – Smirnova test was used to test above hypotheses which results are indicated in Table 2.

**Table 2:** Results of Kolmogorov – Smirnova test

Variable	Z statistic	Asymp(sig)
Size of Company	1.102	0.231
Tobin's Q Ratio	2.682	0.000
Capital Expenditures Ratio	6.334	0.000
Noncash Working Net Capital Ratio	1.159	0.194
Short Term Debts Ratio	1.181	0.189

Results of (K-S) test revealed that distribution of different variables such as size of the company, noncash net working capital ratio and short term debts ratio had normal distribution while other variables did not. Moreover, as the dependant variable (asymmetric cash flow sensitivity) was qualitative, it is not normal and non-parametric

methods were employed for testing research hypotheses.

**6.3. Unit root test (Durability)**

Augmented Dickey-Fuller test (ADF) was used to assess durability of variables. Results of this test are represented in Table 3.

**Table 3:** Unit root test results (ADF test)

Variable	number of interrupts	t statistic	significance level
Size of Company	0	- 4.246	0.000
Tobin's Q Ratio	0	-16.011	0.000
Capital Expenditures Ratio	0	26.769	0.000
Noncash Working Net Capital Ratio	0	-28.207	0.000
Short Term Debts Ratio	0	-26.294	0.000

Considering above Table, all variables have 95% of durability.

The hypothesis: financial constraints resulted from liquid assets affect asymmetric cash flow sensitivity of companies. Following maximum likelihood – binary logit regression model was used to assess first hypothesis.

**7. Testing the research hypotheses**

**Table 4:** Results of testing second hypothesis

Variable	Variable symbol	Coefficient	Z statistic	Prob.
financial constraints resulted from liquid assets	$\beta_1$ (CH*Cons)	4.335	5.401	0.000
Tobin's Q Ratio	$\beta_2$ (Q)	1.173	3.876	0.000
Size of Company	$\beta_3$ (SIZE)	0.185	1.976	0.048
Capital Expenditures Ratio	$\beta_4$ (EXP)	0.757	2.972	0.003
Shares Acquisition	$\beta_5$ (ACQ)	1.245	2.032	0.040
Noncash Working Net Capital Ratio	$\beta_6$ (ANCWC)	-0.161	- 0.213	0.831
Short Term Debts Ratio	$\beta_7$ (SHORT_DBT)	0.106	0.007	0.193
Constant	C	-1.547	- 0.916	0.359
Maximum likelihood estimation (LR Test)			117.257	
significance level(Prob.)			(0.000)	
StatisticHL			57.429	
significance level(Prob.)			(0.000)	
(Andrews Statistic)			241.626	
significance level(Prob.)			(0.000)	
McFadden determination coefficient			0.235	

As indicated in Table 4, significance level of LR (0.000) statistic is less than accepted error level (5%) and regression model is totally significant. Results of goodness of fit test (HL and Andrews

Tests) revealed that mentioned regression model is appropriately fitted. As probability level of Z statistic is less than accepted error, the results of testing  $\beta_2$  coefficient indicate that financial constraints

resulted from liquid assets has positive and significant impacts on asymmetric cash flow sensitivity of companies and asymmetric cash flow sensitivity will increase about 4.335 units by one unit increase of financial constraints resulted from liquid assets. Therefore, second hypothesis cannot be rejected by 95% of certainty. The results also revealed that control variables of Tobin's Q ratio, size of the company, capital expenditure ratio and share acquisition have positive and significant impacts on asymmetric cash flow sensitivity with 5% level of error. McFadden determination coefficient also represents that inserted variables in above regression had explained 23.5% of changes of asymmetric cash flow sensitivity.

## 8. Conclusion

The main purpose of this study was investigating the impacts of financial constraints resulted from liquid assets on asymmetric cash flow sensitivity of companies listed in Tehran Stock Exchange. According to theoretical principles of this study, the results revealed that financial constraints resulted from liquid assets have positive impacts on asymmetric cash flow sensitivity and these results were in accordance with results of Dichou et al. (2014) study. It can be concluded that asymmetric cash flow sensitivity is one of the liquidity behaviors of commercial units and if the company encounter such conditions, banks and credit institutes will react such conditions. Banks and financial institutes are gathering and processing data by supervising the companies. Such information may confirm that loaners will refund given facilities. Therefore, financial facilities will not be paid when they are not assure about repayment of them or may be asked such firms to settle received loans before related due dates. Such measures will result in considerable decrease of cash holdings and may increase sensitivity of asymmetric cash flows.

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