

# Studying the Relationship between Liquidity Risk and Market Risk with Non-Ordinary Return at Fama—French Three Factor Model at Tehran Stock Exchange

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## Abstract

Each financial market in compliance with broadness and depth has several diverse tools for making investment and investors make investment according to return and asset risk. There are different types of risk and investors due to each of them demand for taking risk. In this research, the effect of information quality is studied by regarding liquidity risk, effect of information quality by regarding risk of market on non-ordinary return at Fama-French three model factor. In this research the stock return influenced by Small Minus Big (SMB) and High Minus Low (HML) that are available at Fama-French three model factor was eliminated. In addition corporate properties and market are considered as market risk variables and liquidity risk. Results show that model is acceptable.

**Keywords:** liquidity risk, market risk, auality of information

## 1. Introduction

One of the models for anticipating expected return of stock is Capital Assets Pricing Model (CAPM). This model is based on hypothesis of complete competition and equal access of dealers to asymmetrical information. Due to deficiencies of this model, Fama-French (1993) introduced the three factor model. CAPM is among the first pricing models and the expected return of stock is only influenced by beta market. In continuation researchers recognized other effective factors such as: size, ratio of book value to stock market value, liquidity risk, leverage and etc. The main goal of offering accounting information and financial reporter to stock market, assistance for making decision and more determined judgment. Higher quality financial information leads to higher quality decisions and judgments. One of the most important applications of financial markets specially capital market is increasing liquidity effect of financial assets and reducing related risk to liquidity. Investment is attractive depending on liquidity ability that is regarded as important aspects of the process of allocating optimum resources. Liquidity is among great risk resources for investors i.e. market liquidity plays key role on stability of financial systems; since, cash markets are able to attract systematic shocks. For example, cash market is able to reduce pressure due to price fluctuation as a result of sudden change at risky investment. Liquidity prevents from imbalance at market; since, risk is better distributed (Acharya & Pedersen, 2005).

## 2. Theoretical Basis & Research Background

Up to now several researches are performed about effective factors on expected stock return and each of the researches attempted to study one or several effective factors on expected return. CAPM is the only factor determining difference of stock return as systematic risk or beta coefficient and empirical evidences show that beta as systematic risk index is not able to describe difference stock return (Robatmili, 2007). Fama-French (1992) by using CAPM and previous studies offered their three factor model that consists of  $\beta$ , size of firm and book-to-market value

$$E(R_i) - R_f = b_i(E(R_m) - R_f) + S_i E(SMB) + h_i E(HML) \quad (1)$$

In this formula  $E(R_i) - R_f$  is additional return of firm in comparison to return without risk. In this model the

market risk as  $\beta$  is regarded as CAPM. In the regression formula offered by Fama-French it is called market factor or MKT. After offering CAPM based on effective market hypothesis, many researches carried out about its validity. Empirical tests for CAPM showed that market risk is not the only effective risk factor on expected rate of return and during 1980's many economists attention to factors that put market effectiveness or properties of CAPM under question. Non ordinary factors are including accounting information and market information. Investors confirm that if assets have higher risk it leads to higher return and thus one effective factor is asset risk and liquidity ability. If liquidity is less, the share of attraction is less too. Liquidity risk is a type of risk related to stock return and is not eliminated through diversity and originates from effect of price of orders and in one model it is based on not complete competition to risk market (Jeffery ng, 2011). In effective markets since investors are convinced that prices of stock are commonly fair, they enter into transaction and thus volume of market transactions due to absence of information risk is increased that is called increasing market liquidity (Aker, 2002). Postor and Stambough (2003) have discussed market liquidity as important variable on pricing. They announced that liquidity risk describes sensitivity of stock return at unexpected changes of liquidity. Return of each stock should have different sensitivity toward changes at market liquidity; therefore, liquidity risk describes level of loss that is applied to investors for changes at market liquidity. Morataka and Shimizo (1999) defined liquidity market as market having high volume of transaction with minimum effect of price i.e. market liquidity describes ambiguity of market in relation to prices of transactions. Increasing liquidity increases financial risk through reducing portfolio costs and more motivation of investors on making decision for transaction. Studies show that cost of transactions at US market is important economically. Through increasing liquidity, the cost of transaction is remarkably reduced. Reducing market liquidity reveals that there is problem at capital market. In the year 2003, Postor and Stambough referred to the concept of operational liquidity. They announced that stock return of a firm is estimated through unexpected changes of total liquidity (liquidity beta). Then this model consisting of liquidity risk was offered through Fama-French three factor model (1993).

Davis, Fama-French (2000) retested three factor model by using equal weight returns. Their statistical universe consisted of all firms member at Nazdaq, Amex and Nyse except transportation firms during the years 1925 to 1996. Results showed that although all models have mistake, the three factor model best describes average returns. Acharia and Pederson (2005) offered CAPM that studies the relationship between expected market return and expected liquidity of a stock. They believed that a share with low liquidity has simultaneous influence on stock return and its influence on anticipated return in future is very high. Amihud (2002) announced that lack of expected liquidity has positive relationship with additional anticipated stock. He announced that part of additional expected stock is described by lack of liquidity. He claimed that lack of liquidity has more influence on stock of small firms. Chordia (2001) believed that one logical hypothesis is that risk is related to liquidity risks and level of liquidity is effective on asset return. In this research he studied the relationship between expected return of stock and fluctuation of transaction activities as index for liquidity. Hougue and Longharan 2000 observed accruals as inverse criterion for quality of profit and studied the relationship between quality of profit and stock return. They concluded that there is reverse relationship between accruals and stock return or there is direct relationship between quality of profit and stock return. Falah Shamsi and Hashemi (2011) in their research with title of "relationship between liquidity risk and price at Tehran stock exchange" studied the effect of liquidity risk and risk factor, size of firm, book-to-market value and P/E on pricing stock for 2001 to 2008 at Tehran stock exchange. In this study the criterion of lack of liquidity is regarded as liquidity risk. Results show that liquidity risk and book-to-market value B/M does not significant influence on price of stock at Tehran stock exchange; nevertheless, P/E and size of firm has significant influence on price and shows importance of variables and liquidity risk and B/M on pricing of Tehran stock exchange.

### **3. Research Methodology and Executive Methods of Research**

#### *3.1 Research Methodology*

This research with respect to objective is regarded as applied research and with respect to nature is regarded as descriptive correlation research. Analyzing correlation is applied through regression analysis for studying pattern and the relationship between statistical variables. Whereas data of this research is studied at time series simultaneously, the data is mixed (panel). Data panel model measures variables during section and during time. In this research in order for significance of regression it was applied from F statistics and for significance test it was applied from coefficients of regression and T statistics. Chav test is applied for testing stability of coefficients and White Voglascher for stability of variances. In order to find out self-correlation it was applied from Dorbin Watson test. In this research the hypothesis is tested by using regression and OLS method. It was applied from financial statements and market data related to time period and "comprehensive system of Tadbirpardaz Co and "Rahavard Novin 2" and website of Tehran stock exchange.

### 3.2 Society and Time Domain of Research

Statistical universe of this research is all firms listed at Tehran stock exchange from 2001 until 2011. For sampling it was applied from judgmental-analytical sampling method. After extracting statistics of transactions, it was applied from stock exchange software and firms having following conditions were selected:

- 1) Desired firms should be listed at Tehran stock exchange from the beginning of year 2001 until March 20, 2012;
- 2) Firms should be active in stock exchange or should be active during study period;
- 3) The firm should be active at different industries;
- 4) Fiscal year of firm should be ended to March 20 of each year and should not change their fiscal year between years 2001 until 2012;
- 5) The firm should not be among investment firms and mediator firm.

Finally 76 firms were selected.

### 3.3 Research Hypothesis

This research studies the relationship between liquidity and market risk at non-ordinary return at Fama-French model. In this way the following hypothesis is offered:

Hypothesis 1: There is significant relationship between liquidity and non ordinary return.

Hypothesis 2: There is significant relationship between market risk and non ordinary return.

### 3.4 Variables, Definitions and Method of Calculation

#### 3.4.1 Dependant Variable

Pastor and Stambough (2003) referred to market liquidity as an important variable on pricing. They defined liquidity risk as sensitivity of stock market on sudden changes of liquidity. Thus, liquidity risk is level of profit or loss that is offered to investors for changing market liquidity

$$r_{i,d,t+1}^e = \theta_{i,t} + \phi_{i,t} r_{i,d,t} + \gamma_{i,t} + \text{sign}(r_{i,d,t}^e) \cdot v_{i,d,t} + \varepsilon_{i,d+1,t} \quad (2)$$

$d = 1, \dots, D$

$\square_{i,d,t}$  is return of stock  $i$  at  $d$  day and  $t$  month.

$r_{i,d,t}^e = r_{i,d,t} - r_{m,d,t}$  is market return at  $d$  day and  $t$  month

$\square_{i,d,t}$  is Rls volume of  $i$  stock at  $d$  day and  $t$  month.

Through regression analysis of OLS the liquidity of each share is determined monthly that is equal to  $\gamma$ . Market liquidity equals to average liquidity of single stock including:

$$\gamma_t = \frac{1}{N_t} \sum_{i=1}^{N_t} \gamma_{i,t} \quad (3)$$

$N$  is number of stock.

Pastor and Stambough in continuation of study the changes of market liquidity as changes for time between return and unanticipated components at liquidity. Components of cumulative liquidity are including:

$$\Delta \gamma_t = a + b \Delta \gamma_{t-1} + c \left( \frac{m_{t-1}}{m_1} \right) \gamma_{t-1} + u_t \quad (4)$$

$$\gamma = \left( \frac{m_t}{m_1} \right) \frac{1}{N_t} \sum_{i=1}^{N_t} (\gamma_{i,t} - \gamma_{i,t-1}) \quad (5)$$

$$LIQ_t = \frac{1}{100} u_t \quad (6)$$

### 3.4.2 Liquidity Risk Variables & Market Risk

#### 3.4.2.1 Quality of Information

Quality of accruals:

Fransis and et al model 2005 is a balanced model of Dichav and Ditcho 2002 that refers to quality of accruals as follows:

$$TCA_{i,t} = \phi_i^0 + \phi_i^1 CFO_{i,t-1} + \phi_i^2 CFO_{i,t} + \phi_i^3 CFO_{i,t+1} + \phi_i^4 \Delta REV_{i,t} + \phi_i^5 PPE_{i,t} + v_{i,t} \quad (7)$$

$TCA_{i,t}$  is total current accruals of  $i$  company at the end of  $t$  year that is calculated by using following formula.

$$TCA_{i,t} = \Delta CA_{i,t} - \Delta Cash_{i,t} - \Delta CL_{i,t} + \Delta STDebt_{i,t} \quad (8)$$

$\Delta Cash_{i,t}$ : Change at cash of  $i$  firm between year  $t$  and  $t-1$ .

$\Delta CA_{i,t}$ : Change at current assets of  $i$  firm between years  $t$  and  $t-1$ .

$\Delta CL_{i,t}$ : Change at current debit of  $i$  firm between years  $t$  and  $t-1$ .

$\Delta STDebt_{i,t}$ : Change at payment documents or other short term debits at  $i$  firm between year  $t$  and  $t-1$ .

$CFO_{i,t}$ : Cash at  $i$  firm at the end of year  $t$ .

$$CFO_{i,t} = NIBE_{i,t} - TA_{i,t} \quad (9)$$

$NIBE_{i,t}$ : Net profit of accruals for firm  $i$  at year  $t$ .

$TA_{i,t}$ : Total accruals of firm  $i$  at the end of year  $t$ .

$DEP_{i,t}$ : Cost of depreciation for firm  $i$  in the year  $t$ .

$\Delta REV_{i,t}$ : Changes in sale of firm  $i$  in the year  $t$  in comparison to year  $t-1$ .

$PPE_{i,t}$ : Gross properties, equipments and machineries of firm  $i$  at the end of year  $t$ .

$\square_{i,t}$ : Balance that is regarded as criterion for determining quality of accruals.

The balance obtained from variable of quality of accruals determines quality of information i.e. if the level of this balance is fewer, the diversion of waste materials for each share during 5 years ago is less and finally quality of information is increased.

Exactness for Anticipating Profit:

Exactness for anticipating profit is regarded as general index for depending investors for disclosure of information by the firm.

The lower the profit prediction error is, the higher its precision is (Ajinkia et al., 2005). This research calculated prediction error as follows.

$$Error = \frac{EPS_{real} - EPS_{predict}}{EPS_{predict}} \quad (10)$$

#### 3.4.2.2 Market Characteristics Variables

Turnover is equal to number of listed shares of a firm.

Prior return is equal to stock return for the prior month.

Return volatility is obtained by calculating standard deviation of monthly stock returns of each firm during the last three ears.

Size: the size of firm is the very market value of firm, which is given by multiplying number of shares by current price of each share.

#### 3.4.2.3 Firm Characteristics Variables

Growth opportunities, book value/market value (b/m): this is obtained by calculation of book value to market value ratio of each share at the end of each year.

Sales growth: this variable is obtained by calculation of sales variation between year  $t$  and year  $t-1$ .

Duration of operating cycle: to calculate the duration of operating cycles, first, the amount of receivable accounts and goods stock must be added up, and then, their product must be divided by 365.

Capital intensity: this variable is obtained by dividing book value of property, machinery, and equipment by the firm's total assets at the end of each year.

Cash ratio: to calculate cash ratio, cash balance at the end of each period is divided by total current assets.

Financial performance: to measure financial performance, zero and one values are used. After tax net profit is represented by one, and net loss is denoted by zero.

### 3.4.3 Research General Model

Pastor and Stambaugh (2003) operationalized their concept of liquidity. They estimated a stock return covariance of a firm with respect to its unexpected variations of total liquidity (liquidity beta). Then, they presented this model, which incorporated liquidity risk, using Fama and French's three-factor model (1993) (Anji, 2011).

$$r_{i,t} = \alpha_i + \beta_{i,t}^M MKT_{t,t} + \beta_{i,t}^S SMB_t + \beta_{i,t}^H HML_t + \beta_{i,t}^L LIQ_t + \varepsilon_{i,t} \quad (11)$$

where  $r_{i,t}$  denotes the monthly excess stock value over risk-free return for share  $i$  for month  $t$ . LIQ is liquidity factor of stock for month  $t$ . MKT denotes market return, SMB denotes size, and HML represents value factor in Fama and French's Model.

$$\beta_{i,t}^L = \varphi_0 + \varphi_1 Market\ Characteristics_{i,t-1} + \varepsilon_{i,t} \quad (12)$$

$\beta_{i,t}^L$  denotes liquidity beta. Market characteristics  $I, t-1$  is market characteristics, which are expected to affect liquidity risk. Then, to study whether information quality expresses liquidity risk, we extend the above model:

$$\beta_{i,t}^L = \varphi_0 + \varphi_1 Info\ Quality_{i,t-1} + \varphi_2 Market\ Characteristics_{i,t-1} + \varphi_3 Firm\ Characteristics_{i,t-1} + \varepsilon_{i,t} \quad (13)$$

Info Quality $_{i,t-1}$  denotes information quality items, which include accuracy of profit and quality of accrual items.

In this research, we also study the relation between information quality and market risk. Liquidity risk and market risk are systematic risk mechanisms.

$$B_{i,t}^M = \varphi_{0,t} + \varphi_1 Info\ Quality_{i,t-1} + \varphi_2 Market\ Characteristics_{i,t-1} + \varphi_3 Firm\ Characteristics_{i,t-1} + \varepsilon_{i,t} \quad (14)$$

$B_{i,t}^M$  denotes market risk.

We add equations 3 and 4 to equation 1.

$$r_{i,t} = \beta_i^0 + \beta_i^S SMB_t + \beta_i^H HML_t + (\varphi_0 + \varphi_1 Info\ Quality_{i,t-1} + \varphi_2 Market\ Characteristics_{i,t-1} + \varphi_3 Firm\ Characteristics_{i,t-1}) LIQ_t + (\vartheta_{0,t} + \vartheta_1 Info\ Quality_{i,t-1} + \vartheta_2 Market\ Characteristics_{i,t-1} + \vartheta_3 Firm\ Characteristics_{i,t-1}) MKT_t + \varepsilon_{i,t} \quad (15)$$

$$\varepsilon_{i,t} = r_{i,t} - \hat{\beta}_i^0 - \hat{\beta}_i^S SMB_t - \hat{\beta}_i^H HML_t \quad (16)$$

In this stage, we exclude stock return  $i$ , which was affected by HML and SMB.

$$\varepsilon_{i,t} = \varphi_{0,t} + (\varphi_1 Info\ Quality_{i,t-1} + \varphi_2 Market\ Characteristics_{i,t-1} + \varphi_3 Firm\ Characteristics_{i,t-1}) LIQ_t + (\vartheta_{0,t} + \vartheta_1 Info\ Quality_{i,t-1} + \vartheta_2 Market\ Characteristics_{i,t-1} + \vartheta_3 Firm\ Characteristics_{i,t-1}) MKT_t + v_{i,t} \quad (17)$$

Characteristics of final regression in analysis are as follows:

$$\varepsilon_{i,t} = \varphi_{0,t} + (\varphi_1 Info\ Quality_{i,t-1} + \varphi_2 Market\ Characteristics_{i,t-1} + \varphi_3 Firm\ Characteristics_{i,t-1}) LIQ_t + (\vartheta_{0,t} + \vartheta_1 Info\ Quality_{i,t-1} + \vartheta_2 Market\ Characteristics_{i,t-1} + \vartheta_3 Firm\ Characteristics_{i,t-1}) MKT_t + \omega_1 Info\ Quality_{i,t-1} + \omega_2 Market\ Characteristics_{i,t-1} + \omega_3 Firm\ Characteristics_{i,t-1} + v_{i,t} \quad (18)$$

LIQ and MKT are considered to be symmetric with respect to  $\varepsilon_{i,t}$ , because the objective is to study sensitivity of stock return to these factors. All other independent variables are considered to be for the prior month to make sure that information required for evaluation of share is provided to shareholders.

## 4. Results

### 4.1 Descriptive Statistics

Descriptive statistics related to dependant and independent variables are presented as follows:

Table 1. Centrality index and distribution of dependent and independent variables

Index	Variable				
	Profit accuracy	Accrual items quality	Liquidity risk	Market return	Transactions size
Mean	.1450	-.0143204	-.0014	.0003	12713.6495
Standard deviation	1.43706	.19507332	.04498	.00444	351049.39689
Variance	2.065	.038	.002	.000	1232356790565.125
Skewness	-6.842	-23.320	3.640	24.997	6.938
Kurtosis	90.624	632.640	190.908	710.828	303.408
Sample size	1049	1049	1048	1049	1021

  

Index	Variable				
	Prior return	Return viability	Market size	Book-to-market value	Sales growth
Mean	75549.1153	46.2378	.0330	4.8976	151010.0859
Standard deviation	740562.21354	512.74312	.31356	107.57362	1402196.64543
Variance	548432392117.896	262905.511	.098	11572.083	1966155432459.497
Skewness	9.568	-.770	15.771	29.058	9.608
Kurtosis	186.872	121.299	266.603	899.209	130.467
Sample size	1049	1049	1049	1049	1049

  

Index	Variable				
	Operating cycle	Capital density	Cash ratio	Financial performance	Stock return
Mean	321.5738	8741.3015	.1504	.0080	.2420
Standard deviation	8033.53205	201871.62462	1.21118	.21145	2.47093
Variance	64537637.242	40752152828.734	1.467	.045	6.105
Skewness	31.099	11.271	-5.778	-10.288	-7.478
Kurtosis	989.179	308.346	73.769	160.666	100.394
Sample size	1045	1049	1046	1049	1049

### 4.2 Analysis of Assumptions

Use of linear regression models requires that certain conditions are met and certain assumptions hold, and if any of them are violated, characteristics desirability of regression estimations is reduced, and research hypotheses test will encounter with problem. In this research, the credible kolmogorov-smirnov test was used to test research data normality assumption. To normalize the data, or, in other words, to normalize the variables, we used cox-box transformations. Lack of self-correlation between error terms is one of the essential assumptions for OLS method. One of common tests of lack of self-correlation is Durbin-Watson test. The value obtained for Durbin-Watson statistic is equal to 1.93. Since value of this statistic is within 1.5–2.5, there the model's errors are not correlated ones. In other words, the errors are not self-correlated.

Table 2. Durbin-Watson test

Criterion	Numerical value of variables	Criterion	Numerical value of variables
Mean dependant variable	1781259	R-squared	0.228
S.D. dependant variable	15103037	Adjusted R-squared	-0.002499

Alkaike info criterion	35.90688	S. E. of regression	15121894
Schwartz criterion	35.93521	Sum squared resid	2.39E+17
Hannan-Quin Criterion	35.91762	Log likelihood	-18845.11
Prob (F-statistic)	0.009	F-statistic	0.477068
D-Watson	1.93		

Another assumption in model fit is the assumption that error term variance is stable. One of the tests to detect heteroskedasticity is white and Glejser test. Value of Glejser statistic was obtained to be equal to 4.41. Significance level obtained from this test was equal to 0.49. Because this is greater than significance level of the test, 0.05, therefore, errors variance is stable.

Table 3. Variances stability test—Glejser's test

Heteroskedasticity Test: Glejser			
<b>F-statistic</b>	0.88129	<b>Prob. F(9.37)</b>	0.4929
<b>Obs*R-squared</b>	4.41314	<b>Prob. Chi-Square(9)</b>	0.4916
<b>Scaled explained SS</b>	11.5313	<b>Prob. Chi-Square(9)</b>	0.0418

Implied assumption in a multivariable model is that model coefficients are stable. In other words, estimations of these coefficients over the whole period and over a part of the period give the same results. One of the tests of objectivity coefficients is Chow test, which is analyzed below.

In this research, the whole period was divided to two periods, and Chow test was performed. It follows from Chow test that value of this statistic is equal to 14.72. The significance level obtained from this test was 0.0225. Because this is smaller than test significance level, 0.05, therefore, the coefficients are stable. In other words, estimations of these coefficients over the whole period and over a part of the period give the same results.

Table 4. Coefficients stability test—Chow test

Chow Breakpoint Test: 525			
<b>F-statistic</b>	2.4439	<b>Prob. F(10.27)</b>	0.0237
<b>Log likelihood ratio</b>	14.7291	<b>Prob. Chi-Square(10)</b>	0.0225
<b>Wald Statistic</b>	14.6634	<b>Prob. Chi-Square(10)</b>	0.023

#### 4.3 Model Fit

$$\begin{aligned} \varepsilon_{i,t} = & \varphi_{0,t} + (\varphi_1 \text{Info Quality}_{i,t-1} + \varphi_2 \text{Market Characteristics}_{i,t-1} + \varphi_3 \text{Firm Characteristics}_{i,t-1}) \text{LIQ}_t \\ & + (\vartheta_{0,t} + \vartheta_1 \text{Info Quality}_{i,t-1} + \vartheta_2 \text{Market Characteristics}_{i,t-1} \\ & + \vartheta_3 \text{Firm Characteristics}_{i,t-1}) \text{MKT}_t + \omega_1 \text{Info Quality}_{i,t-1} \\ & + \omega_2 \text{Market Characteristics}_{i,t-1} + \omega_3 \text{Firm Characteristics}_{i,t-1} + v_{i,t} \end{aligned} \quad (19)$$

Fit of this model was performed in three stages. In this model, first, the effect of liquidity risk variables was studied, followed by market risk variables, and finally, effect of control variables on dependant variable was studied.

Table 5. Regression model fit, part 1

Variables	Variables coefficient	Standard deviation	T-statistic	Significance level	Comparison with 0.05	Result in the model
Constant	.58	.016	3.676	.000	Smaller than 0.05	It is effective
Info Quality*LIQ	-4.973	1.293	-3.846	.000	Smaller than 0.05	It is effective

Turnover*LIQ	5.680E-0.06	.000	2.547	.011	Smaller than 0.05	It is effective
Prior return*LIQ	9.822E-007	.000	2.009	.045	Smaller than 0.05	It is effective
Return	.030	.001	20.672	.000	Smaller than 0.05	It is effective
Volatility*LIQ						
SMB*LIQ	-25.038	1.173	-21.352	.000	Smaller than 0.05	It is effective
HML*LIQ	.015	.001	10.886	.000	Smaller than 0.05	It is effective
Sales Growth*LIQ	1.177E-006	.000	2.044	.041	Smaller than 0.05	It is effective
Operating cycle*LIQ	.015	.006	2.444	.015	Smaller than 0.05	It is effective
Capital Intensity*LIQ	6.477E-006	.000	1.64	.288	Greater than 0.05	It is not effective
Cash ratio*LIQ	2.713	1.701	1.595	.111	Greater than 0.05	It is not effective
Loss*LIQ	-29.579	3.459	-8.551	.000	Smaller than 0.05	It is effective
Durbin-Watson Statistic	2.040	In this mode, errors are not correlated.				
Model objectivity coefficient	0.767	76.7 percent of stock return sensitivity is accounted for by the variables of the model.				
Model significance level	0.000	The linear relation of model is accepted.				
Result of model fit	Model has an acceptable fit					

Table 6. Regression model fit, part 2

Variables	Variables coefficient	Standard deviation	T-statistic	Significance level	Comparison with 0.05	Result in the model
Constant	.051	.009	5.435	.000	Smaller than 0.05	It is effective
Info Quality*MKT	66.738	3.030	22.029	.000	Smaller than 0.05	It is effective
Turnover* MKT	.000	.000	-8.425	.000	Smaller than 0.05	It is effective
Prior return* MKT	.000	.000	18.876	.000	Smaller than 0.05	It is effective
Return Volatility* MKT	-.161	.019	-6.957	.000	Smaller than 0.05	It is effective
SMB* MKT	-301.205	10.255	-29.371	.000	Smaller than 0.05	It is effective
HML* MKT	.745	.022	33.441	.000	Smaller than 0.05	It is effective
Sales Growth* MKT	.000	.000	-4.795	.000	Smaller than 0.05	It is effective
Operating cycle* MKT	-1.389	.131	-10.611	.000	Smaller than 0.05	It is effective
Capital Intensity* MKT	-.220	.000	-6.670	.000	Smaller than 0.05	It is effective
Cash ratio* MKT	-12.042	8.108	-1.485	.138	Greater than 0.05	It is not effective
Loss* MKT	308.574	21.506	14.348	.000	Smaller than 0.05	It is effective
Durbin-Watson Statistic	1.815	In this mode, errors are not correlated.				
Model objectivity coefficient	0.918	91.8 percent of stock return sensitivity is accounted for by the variables of the model.				
Model significance level	0.000	The linear relation of model is accepted.				
Result of model fit	Model has an acceptable fit					

Table 7. Regression model fit, part 3

Variables	Variables coefficient	Standard deviation	T-statistic	Significance level	Comparison with 0.05	Result in the model
Constant	-.23	.013	-1.832	.067	Smaller than 0.05	It is effective
LIQ	-8.521	.481	-17.713	.000	Smaller than 0.05	It is effective
MKT	-54.201	5.423	-9.995	.000	Smaller than 0.05	It is effective
Info Quality	.216	.052	4.180	.000	Smaller than 0.05	It is effective
Turnover	-1.715E-007	.000	-3.677	.000	Smaller than 0.05	It is effective
Prior return	-1.014E-007	.000	-5.572	.000	Smaller than 0.05	It is effective
Return Volatility	6.235E-006	.000	.157	.876	Smaller than 0.05	It is effective
SMB	-.749	.981	-.763	.446	Smaller than 0.05	It is effective
HML	-.002	.001	-3.747	.000	Greater than 0.05	It is not effective
Sales Growth	-4.913E-008	.000	-4.767	.000	Greater than 0.05	It is not effective
Operating cycle	-7.883E006	.000	-.846	.398	Greater than 0.05	It is not effective
Capital Intensity	-2.684E-009	.000	-.038	.970	Greater than 0.05	It is not effective
Cash ratio	.142	.093	1.525	.128	Greater than 0.05	It is not effective
Loss	.878	.141	6.219	.000	Smaller than 0.05	It is effective
Durbin-Watson Statistic	1.931	In this mode, errors are not correlated.				
Model objectivity coefficient	0.918	84.9 percent of stock return sensitivity is accounted for by the variables of the model.				
Model significance level	0.000	The linear relation of model is accepted.				
Result of model fit	Model has an acceptable fit					

## 5. Conclusions and Suggestions

The results from part 1 of regression analysis show that:

From table 5, it is concluded that because significance level of F (Fischer) was equal to 0.000, and this value is smaller than the test's significance level; therefore, linearity of model is confirmed. Also, given the table of significance level of independent variables of turnover,  $LIQ \times$  Info Quality,  $LIQ \times$  Prior Return,  $LIQ \times$  Return Volatility,  $LIQ \times$  SMB,  $LIQ \times$  HML,  $LIQ \times$  Loss,  $LIQ \times$  Operating Cycle, and  $LIQ \times$  Sales Growth is equal to 0.000, and this value is smaller than 0.05, therefore, these variables have an effect on abnormal interval. However, significance level of variables of  $LIQ \times$  Capital Intensity and  $LIQ \times$  Cash Ratio are 0.288 and 0.111, respectively, which values are greater than 0.05. Therefore, these variables have no effect on  $\epsilon_{i,t}$ . Objectivity coefficient of the model is equal to 0.767. That is, 76.7 of variations of independent variable is accounted for by  $LIQ \times$  Info Quality,  $LIQ \times$  Prior Return,  $LIQ \times$  Return Volatility,  $LIQ \times$  SMB,  $LIQ \times$  HML,  $LIQ \times$  Loss,  $LIQ \times$  Operating Cycle, and  $LIQ \times$  Sales Growth. Also, Durbin-Watson statistic index was equal to 20.40, and because this value in 1.5-2.5 interval, therefore, it is concluded that errors resulting from the model are not correlated.

Results from part 2 of regression analysis show that:

From table 6, it is concluded that because significance level of F (Fischer) was equal to 0.000, and this value is smaller than the test's significance level; therefore, linearity of model is confirmed. Also, given the table of significance level of independent variables of  $MKT \times$  Info Quality,  $MKT \times$  Prior Return,  $MKT \times$  Return Volatility,  $MKT \times$  SMB,  $MKT \times$  HML,  $MKT \times$  Loss,  $MKT \times$  Operating Cycle, and  $MKT \times$  Sales Growth is equal to 0.000, and this value is smaller than 0.05, therefore, these variables have an effect on abnormal interval. However, significance level of variable of  $MKT \times$  Cash Ratio is 0.138, which value is greater than 0.05.

Therefore, this variable has no effect on  $C_{i,t}$ . Objectivity coefficient of the model is equal to 0.918. That is, 91.8% of variations of independent variable is accounted for by  $MKT \times$  Info Quality,  $MKT \times$  Prior Return,  $MKT$ ,  $MKT \times$  Return Volatility,  $MKT \times$  SMB,  $MKT \times$  HML,  $MKT \times$  Loss,  $MKT \times$  Operating Cycle, and  $MKT \times$  Sales Growth. Also, Durbin-Watson statistic index was equal to 1.815, and because this value in 1.5-2.5 interval, therefore, it is concluded that errors resulting from the model are not correlated.

Results from part 3 of regression analysis show that:

From table 7, it is concluded that because significance level of F (Fischer) was equal to 0.000, and this value is smaller than the test's significance level; therefore, linearity of model is confirmed. Also, given the table of significance level of independent variables of LIQ, MKT, Info Quality, Prior Return, HML, Capital Intensity, Loss, and Sales Growth is equal to 0.000, and this value is smaller than 0.05, therefore, these variables have an effect on abnormal interval. However, significance level of variable of Return volatility, SMB, Operating Cycle and Cash Ratio is 0.138, which value is greater than 0.05. Therefore, this variable has no effect on  $C_{i,t}$ . Objectivity coefficient of the model is equal to 0.849. That is, 84.9% of variations of independent variable are accounted for by LIQ, MKT, Info Quality, Prior Return, HML, Capital Intensity, Loss, and Sales Growth. Also, Durbin-Watson statistic index was equal to 1.931, and because this value in 1.5–2.5 interval, therefore, it is concluded that errors resulting from the model are not correlated.

High information quality and information symmetry results in higher coordination and interaction between managers and investors with respect to investment decisions. On the contrary, the higher the information dissymmetry between managers and investors is, the higher the expected return rate demanded by investor is, because they assume greater risk. Pastor and Stambaugh (2003) stated that liquidity risk is the profit or loss that is experienced by investors as a result of market liquidity variations, therefore, deficiency of liquidity results in formation of a sensitivity that has a negative effect on stock value, and results in investors leaving the market. Reduced market liquidity usually indicates problems in capital market. For example, reduced market liquidity is related with higher prices and higher pressure to sell in market value. Securities liquidity is one of the important factors affecting proper and successful performance of capital market. On the other hand, one of the major advantages of securities investors over other investment opportunities investors is high liquidity of securities. Reduced liquidity is one the important causes of reduced stock exchange investment, which affects stock return of listed firms, and in effect increases stock jobbery.

In their decisions, the investors always prefer investment in high liquidity securities, and seek risk premium in accepting high illiquidity securities. Given shareholders expected return increases as liquidity risk increases, therefore, in order to reduce risk, firms must consider profit quality as well as considering factors affecting risk.

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