

## Stock Liquidity and Stock Return: The Moderating Role of Financial Constraint Using Structural Equation Modeling Approach

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### ABSTRACT

*Objective – The purpose of this study was to investigate the relationship between stock liquidity and stock returns with a focus on the moderating role of financial constraints. Methodology/Technique – A structural equation modeling approach is applied in this research. The sample of this study consists of companies that were consistently listed on the Tehran Stock Exchange from 2009 to 2017. Findings – The results indicated that the financial constraints associated with stock liquidity and stock returns play a moderating role, and in particular, the relationship of these variables in firms with no financial constraints is much stronger than those with limited constraints. The results indicate that the effect of stock liquidity on stock returns in companies with financial constraints is different from that of the companies without financial constraints in a way that the effect of stock liquidity on stock return in health companies is stronger than that of the companies with financial constraint. Novelty - it is suggested that capital market activists, financial analysts and potential and actual investors of stock exchanges, take into consideration the conditions and financial constraints of the companies.*

**Keywords:** Stock Returns, Stock Liquidity, Financial Constraints, Structural Equations.

### 1. INTRODUCTION

The capital market is one of the cornerstones of each country's economic system. This marketplace is the one for aggregating low-cost, indefinite and scattered resources in the context of various economic units. The proper functioning of the exchange can have valuable consequences, such as economic growth and development. In order to be able to lead the savings to this market, it is necessary to attract the trust of investors. Investors always attempt to invest their savings in the most efficient way. However, they should also consider the risk associated with investing because the company's risks have impacts on the expectations of shareholders (Hassani & Nabizadeh, 2017). Return on investment is a driving force that brings about motivation and is the main factor in the evaluation and selection of investment. There are various factors to determine the risk and efficiency of a company. These factors can be of economic, social and condition of capital market type. Since the investors tend to pursue the most profitable and low-risk opportunities for investment, studying and examining the factors affecting the stock return can be useful in making decisions regarding the capital market which an also bear implications for the stock activists, including the financial institutes, company managers,

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economic system supervisors, and conventional investors. Since the theories concerning the financial topics are of immense significance affecting the stock return is the stock liquidity. Stock liquidity is one of the main advantages of stock exchanges, and the investors always pursue the stocks which can be traded with the lowest possible cost (Saeidi & Dadar, 2009). Investors expect the return due to the investment risk. Thus, risk awareness and investment return are of great importance. In fact, liquidity is the most crucial measures of capital market development. When it comes to rank the extent of development across stock markets, one of the top measures in the level of stock liquidity. Considering the studies conducted, the liquidity of stock has effects on the decision-making of investors concerning the stock choosing since the investors take into consideration the fact if they tend to sell their assets, there will be any suitable market for them (Mohammadzadeh & Dehghankar, 2016).

During the past decades, evaluations of criteria dealing with the stock liquidity have been attracted by the financial literature. The issue of Tehran Stock Exchanges liquidly is one of the main concerns of investors and due to the liquidity mechanisms, it falls into the category of non-liquid stocks worldwide (Saeidi & Dadar, 2009). The restrictions on the study of liquidity in the Tehran Stock Exchange have led us to study the ability of stock liquidity in the supply side. Hence, it is necessary to understand and measure the factors determining the stock liquidity criteria when it comes to assessing the competitive market structure (Hyeesoo et al, 2013). The review of previous studies show that stock liquidity is one of the most affecting factors on the stock return which has received little attention, and there is continuous effort to determine proper criteria for evaluating the stock liquidity (Davallou & Ardakani, 2016). Additionally, researchers have identified results concerning the relationship between stock liquidity and stock return (see Jun, Marathe & Shawky, 2003; Raei, Fallahpour & Sarkanian, 2016; Hassani & Nabizadeh, 2017). It seems that one of the elements which derive such results is the non-homogeneity of the sample. Furthermore, one of the elements leading to a lack of consensus over the stock liquidity is the way evaluation is processed in the context of stock liquidity and the affecting factors in this regard. The concept of financial constraints is one of the most important issues for all firms, and the quality of decision-making when confronting such conditions is the most fundamental questions in the financial literature (Almeida & Campello, 2007).

In most of the financial models, the assumption is that there is the interaction which means that the liquidity is constant and positioned in higher levels while examining the financial constraints clearly represent that liquidity is not constant over time for the individual stock exchanges and stocks at the market level which can also be reduced dramatically (Mohammadzadeh & Dehghankar, 2016).

Although numerous studies have been carried out regarding the factors affecting the stock return, few studies have considered the role of liquidity and financial constraints as one of the main components. Studies conducted in this field have examined the effect of these two variables on the stock return individually. The purpose of the present study was to determine the relationship between stock liquidity and stock return under financial constraints condition through the structural model equations. Subsequently, it is determined if the stock liquidity affects the stock return under financial constraints and lack of financial constraint differ.

## 2. LITERATURE REVIEW

### 2.1 Stock Liquidity and Stock Return

Liquidity is a complex concept and various definitions have been proposed in this regard. Liquidity can be examined both on the individual security level such as the determined share and the stock market. In simpler terms, liquidity can be defined as the capability of a cost-free exchange. Liquidity accompanies values so that under equal conditions, securities with higher

liquidity would have higher costs compared to the ones with lower liquidity (Johnson, 2008). Liquidity is an important criterion in the market. In markets with high liquidity, the size of exchange enables the integrity of exchanges. In such markets, the trend of cost increase is low and the cost differences among the exchanges are low. The orders are high enough which can approach the highest demand cost with the lowest supply cost. Liquidity is of great importance for the stock exchanges since the center which exchanges the securities with higher liquidity compared to the counterparts can expect the greater size of the exchanges. Studies conducted concerning the effect of liquidity on the stock return show that there is a positive relationship between stock return and total market liquidity. Such a relationship is common in developed markets and some studies like the one led by Jun et al (2003) confirmed this relationship in newly emerged markets. In Jun's study, the effect of market total liquidity on stock return has been confirmed which is consistent with the results of studies undertaken in developed markets. Weigedring and Hanke (2018) studied their determinants of stock return in their research. They showed most of the changes in seasonal stock returns were due to changes in the liquidity of the market using the constant effects model that throughout the years 2002 to 2009. Nguyen and Lo (2013) explored the relationship between stock liquidity and stock returns in New Zealand's developed but small market. They showed that, unlike the theory of liquidity, there is an important fraction for non-liquidity, and liquidity risk is unlikely to be priced. Hassani and Nabiezhadeh (2017) also narrated that there is a significant and positive relationship between lack of stock liquidity and expected returns. This means that due to the mutual relationship between risk and return on the stock market, by decreasing (increasing) the liquidity risk of the stock, we will see the matching changes in order to reduce (increase) the expected return on the stock of the companies under study.

Nowadays, three important factors, namely, risk, return, and liquidity attract the management. Thus, one of the important factors which are considered in choosing every type of investment is the liquidity of such alternatives. Based on the capital market division theory, different investors are enforced to invest their funds in assets with different liquidity strengths through considering the need for liquidity. Such a capability implies rapid sale and conversion of securities to the cash flows. Low liquidly means that the stock shares high levels of non-liquidity risk and investors expect a higher stock return for the investment. The importance of liquidity arises from the fact that it influences the performance of the investment and pays a vital role in assets diversity strategies. Also, liquidity has considerable effects on the temporary fluctuations of asset returns as a measure or risk element, thus playing a key role in determining the proper asset complex and establishing diversity as well as flexibility in terms of the risk and return (Acharya & Pedersen, 2005).

## 2.2 Financial Constraints, Liquidity and Stock Returns

As suggested by Kaplan and Zinglaes (1997), companies are said to experience financial constraints when there is a gap between the internal and as external uses of allocated funds. Considering this definition, all companies can be categorized as the ones with financial constraints while financial constraints are different. In case the difference between internal and external uses of the investment funds is high, the company is considered to have higher levels of financial constraints. In general, companies without financial constraints or lower financial constraints are the ones which enjoy assets with high liquidity capability (Mohammadzadeh & Dehghankar, 2016). When the company encounters financial constraint, serious repercussions are expected to be observed for most of the internal and external economy agents such as the stakeholders, loaners, customers, suppliers, employees and managers (Sanchez et al, 2013). Deficiencies in Iran's capital market have resulted in financial constraints on the part of companies which can be resolved through determining the reason for financial contestants and proper response of companies when confronting this phenomenon. Although determining the reason for financial problems or constraints is not a simple task to accomplish, in some cases, several reasons together cause the financial constraint occurrence. Some studies introduce the

asymmetric information (happens when one or some investors hold the private information of the company value) and agency costs (due to the ownership separation and control) as the most important factors in this regard (Ozkan & Ozkan, 2004).

It is worth noting that the use of financial support strategies is not always a simple task to accomplish and companies face constraints with respect to the financial resources both internally and externally.

As indicated earlier, financial constraints have serious repercussions for most of the internal and external economic factors. Lack of proper management of risks and occurrence of hard financial conditions impose larger constants on companies. Under such conditions, the probability of occurring unpredicted events increases and managers are coerced to make their decisions through controlling the conditions so that they cannot provide the benefits of stakeholders efficiently compared to the convenient conditions. Therefore, the relationship between the determining factors of stock return under financial constraints can be different from that of the normal conditions with respect to the specific company-related characteristics.

Therefore, according to the theoretical and experimental background of research, the research hypotheses are presented as follows:

Hypothesis 1: There is a positive and significant relationship between stock liquidity and stock returns.

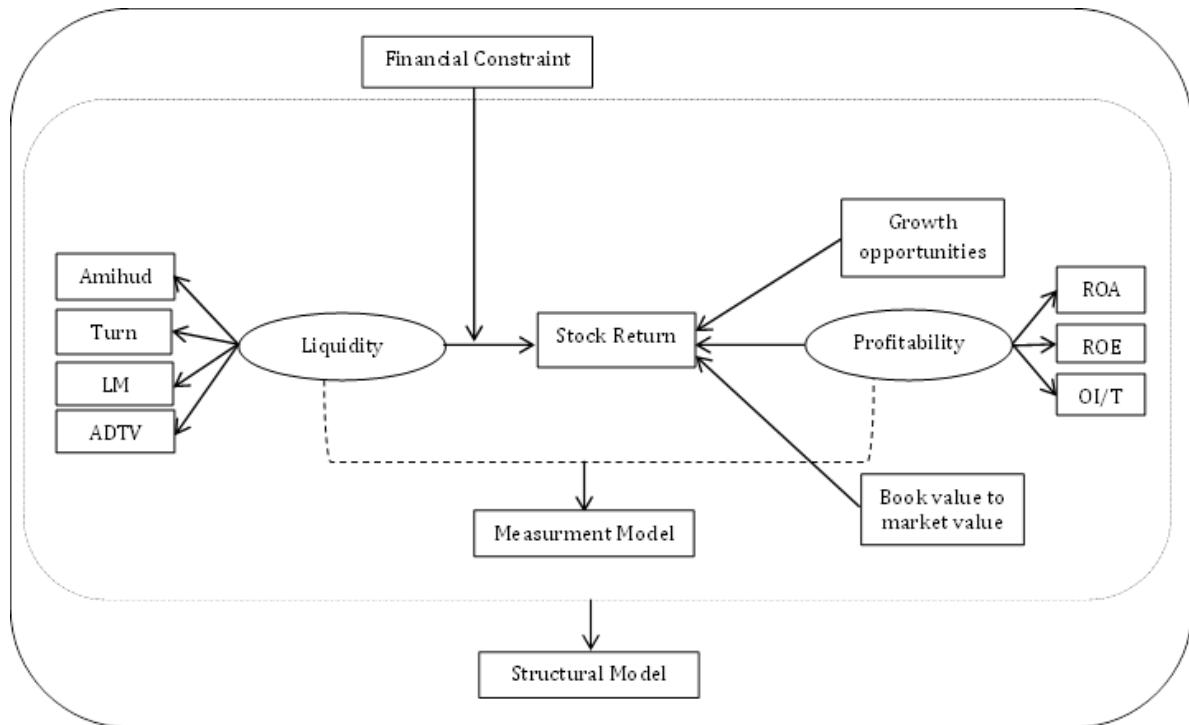
Hypothesis 2: The moderating variable of financial constraint affects the relationship between stock liquidity and stock returns negatively and significantly.

### 3. METHODOLOGY

The study is applied, "causal" and "post-event" type in terms of the goal and design. This kind of methodology is used for studies that seek to investigate the cause of certain relationships that have already taken place in the past and. In this research, in order to provide a quantitative test for a hypothetical model, relations between variables are formulated in a causal model such as the "structural equation model" in a coherent framework. The structural equation model is basically a combination of path models and confirmative factor analysis models.

To test the research hypotheses, a two-stage process will take place. First, the acceptable fitting of the measurement model must be ensured, and then the fitting of the structural pattern (the effect of determinants on stock returns) should be considered. The present research is based on the period of the years 2009 to 2017 and includes the companies listed in the Tehran Stock Exchange. The statistical sample of the study was selected by using the systematic sampling method and finally, after studying the companies listed in the stock exchange, and systematically eliminating the companies that did not meet the required specifications, as well as by excluding companies that did not hold full data for the target period, 81 companies were selected as the research sample. After classifying the data of sample companies in Excel and SPSS software, AMOS software was used for the statistical analysis.

Having studied various models of factors affecting the stock returns and considering the research background as well as the hypotheses presented in this study, a conceptual model is developed based on the structural equation modeling approach in Figure 1.



**Figure 1.** Conceptual Model.

### 3.1 Implicit Structures and Causes Variables

#### 3.1.1 Stock Liquidity

In this study, the Amihud's non-liquidity criteria, stock turnover, the criteria for the number of days without exchanging on the basis of turnover, and the average exchanging volume used as stock liquidity indicators (Table 1).

**Table 1** Calculating research variables

Variables	Formula	Title
Amihud criteria	$Illiiquid_{i,t} = \frac{1}{D_{i,t}} \sum_{d=1}^{D_{i,t}} \frac{ R_{i,d,t} }{Vol_{i,d,t}}$	$ R_{i,d,t} $ : The stock returns i on day d at month t $Vol_{i,d,t}$ : Stock volume i on day d at month t $D_{i,t}$ : The number of exchanging days i of the month t
Stock turnover	$TO_{i,t} = \frac{Vol_{i,t}}{share_{i,t}}$	$Vol_{i,d,t}$ : Stock volume i on day d at month t $share_{i,t}$ : Number of i shares issued in year t
Number of days without trades based on turnover	$LM = [number of zero daily volumes in prior x-month turnover] / Deflator$	$x-month turnover$ : Turnover throughout the year $Deflator$ : Moderator $NoTD$ : Number of days exchanging shares

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Average Daily Trading Volume	$\bar{V}_{i,t} = \frac{1}{T_{i,t}} \sum_{t=1}^T Vol_{i,t}$	$T_{i,t}$ : Number of days of stock exchanging in year t $Vol_{i,d,t}$ : Stock volume i on day d at month t
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The deflator is chosen to be  $0 < \frac{1/x - month\ turnover_{i,t}}{Deflator} < 1$

(1)

### 3.1.2 Stock Returns

The dependent variable in this research is a return on equity. Return on equity is defined as all the benefits that a shareholder gains during a period. Stock returns for selected companies can be calculated using the following equation (Raei & Pouyanfar, 2010):

$$r_{it} = \frac{[(D_t + p_t)(1 + \alpha + \beta)] - (p_{t-1} + c\alpha)}{p_{t-1} + c\alpha} \quad (2)$$

Where  $P_{it}$  is the stock price at the end of period t,  $p_{it-1}$  is the stock price at the end of period t-1,  $D_t$  is the cash profit per share.

Based on the number of shares at the beginning of the period,  $\alpha$  is the percent increase in capital derived from the claims and cash flows,  $\beta$  is the percent increase in capital derived from accumulated profits, and  $c$  is the nominal amount paid by the investor for raising capital derived from the place of cash (receivables).

In this research, having calculated the monthly returns of the companies' shares, the average annual return of stocks for the periods studied was calculated using the geometric mean.

### 3.1.3 Control Variables

The control variables are as follows: Profitability in which the ROA, ROE and OI/TA are used as indicators for profitability measurements, growth opportunities that are represented by the total growth rate of assets ( $TA_t - TA_{t-1}$ ) /  $TA_{t-1}$  (Pietro et al, 2017) and the ratio of book value to market value of equity (Fama & French, 1992).

### 3.1.4 Moderator Variable (Financial Constraint)

The Kaplan Zingales Model has been used to measure the financial constraint variable. KZ is one of the first models in the field of financial constraints. Kaplan and Zingales (1997) have developed a new criterion for classifying companies in two groups of companies with financial constraints and companies with no financial constraints, which include the following five variables:

$$KZ = -1.002 \left( \frac{CF_{i,t}}{A_{i,t-1}} \right) - 39.368 \left( \frac{Div_{i,t}}{A_{i,t-1}} \right) - 1.315 \left( \frac{C_{i,t}}{A_{i,t-1}} \right) + 3.139 Lev_{i,t} + 0.238 Q_{i,t} \quad (3)$$

Variables include operating cash flows, dividend stock, cash holdings, financial leverage, and Tobin's Q. Hesarzadeh and Tehrani (2009) presented the following Kaplan and Zingales model according to Iran's coordinates;

$$KZ = 17.33 - 37.486 \left( \frac{C_{i,t}}{A_{i,t}} \right) - 15.216 \left( \frac{Div_{i,t}}{A_{i,t}} \right) + 3.394 Lev_{i,t} - 1.402 Q_{i,t} \quad (4)$$

In this study, the indigenous model of this index was used based on Iran's economic climate. For the classification of companies, companies whose calculated KZ index was greater than the median were categorized as companies with financial constraints, and the rest of companies were categorized as normal cases.

#### **4. RESULTS AND DISCUSSION**

##### **4.1 Descriptive Statistics**

The results showed that in the investigated companies, the average value for the dependent variable of research (stock return) was about 24%. Among the indicators of stock liquidity, daily exchanging volume (ADTV) has the highest average (31.293). Also, the moderator indicator dealing with number of days without exchanging on the basis of the LM is the most dispersed, and among the indicators of profitability, return on equity (ROE) has the most dispersion, and among the other control variables used in the research, the growth opportunities are the lowest, and the ratio of book value to the company's market value has the highest standard deviation.

**Table 2** Results of research descriptive statistics

<b>Variable/Index</b>		<b>Mean</b>	<b>Median</b>	<b>Maximum</b>	<b>Minimum</b>	<b>Standard Deviation</b>
Stock liquidity	Amihud	-5.56E - 05	-2.39E-05	0.000	-0.0008	0.0002
	Turn	0.34	0.22	2.15	0.001	0.48
	LM	-67.12	-58	-2	-235	56.8
	ADTV (million share)	1.8222	0.1346	31.2933	0.0034	5.5266
Profitability	ROA	0.13	0.10	3.73	-0.29	0.32
	ROE	0.30	0.24	5.87	-2.94	0.67
	OI/TA	0.14	0.11	2.66	-0.25	0.21
Stock returns	Return	0.24	0.17	2.12	-0.71	0.65
Growth opportunities	Growth	0.17	0.12	1.03	-0.22	0.24
Book value to market value	BM	0.51	0.43	2.62	-2.94	0.50
Jarque-Bera Statistic	Jarque-Bera	0.0001	0.0001	0.0001	0.0001	0.0001
Probability						

#### 4.2 Validation of the Research Measurement Model

The measurement model includes two models related to stock liquidity structure and profitability construct. The following table shows the regression weights, the critical ratio, and the significance level of the research variables. All of the path coefficients of the markers used have a significant level of less than 5% and have a critical ratio greater than 1.96, which indicates that the markers used in the research are appropriate and illustrate that the variable indicators of stock liquidity and the studied profitability have acceptable consistency with the factor structure and theoretical basis.

**Table 3** Results of measuring model estimation

<b>The latent variable path to the observable variable</b>		<b>Standardized Path Coefficient</b>	<b>Critical Ratio</b>	<b>Statistic Probability</b>
Stock liquidity	→	LM	0.668	-
Stock liquidity	→	Amihud	0.309	5.166 0.000
Stock liquidity	→	Turn	0.574	6.183 0.000
Stock liquidity	→	ADTV	0.326	5.358 0.000
Profitability	→	ROA	0.912	-
Profitability	→	ROE	0.780	22.438 0.000
Profitability	→	OI/TA	0.812	23.384 0.000

The software output that is presented with the acceptance level of each indicator in the table below shows the good fit of the model with the data.

**Table 4** Fitting indicators of research measuring model

<b>Research Measuring Models</b>	<b>GFI</b>	<b>CFI</b>	<b>RMSEA</b>	<b>PNFI</b>	$\chi^2/df$
	Greater than 95%	Greater than 95%	Less than 10%	Greater than 50%	Less than 3
Stock liquidity ↔ Profitability	0.984	0.981	0.053	0.601	2.785

#### 4.3 Structural Research Pattern Validation

In order to ensure that the structural equations modeling can be considered as a probable description for the relationship among the tested variables and that the parameters estimated by the maximum likelihood method can be interpreted as reliable, the model fitting is examined. Good fitting indexes of the structural model are presented individually in Table 5.

**Table 5** Fitting indicators of research structural model

<b>Research Measuring Models</b>	<b>GFI</b>	<b>CFI</b>	<b>RMSEA</b>	<b>PNFI</b>	$\chi^2/df$
	Greater than 95%	Greater than 95%	Less than 10%	Greater than 50%	Less than 3
Structural Model	0.969	0.944	0.059	0.656	3.279

The structural model fitting holds values greater than the threshold of acceptance.

#### 1.4 Testing the Research Hypotheses

After examining the fitting of the structural pattern and the absence of a clear difference between the fitting of the structural model and the measurement, we examine the results of the research hypothesis.

Hypothesis 1: There is a positive and significant relationship between stock liquidity and stock returns.

According to the results presented in Table 6, we found a positive statistically significant relation ( $p<0.05$ ) between stock liquidity and the stock returns with a standardized coefficient of 0.098 and a critical ratio of 1.977 (outside the range of  $\pm 1.96$ ). Therefore, there is no reason to reject the first hypothesis of the research indicating that there is a meaningful relationship between stock liquidity and stock returns.

**Table 6** Results of testing the first hypothesis

Research first hypothesis	Path coefficient	Standardized path coefficient	Standard error	Critical ratio	Statistic probability
Stock liquidity → Stock returns	0.002	0.098	0.001	1.977	0.048

**Table 7** The values obtained from estimating the structural model for other effective factors

Research first hypothesis	Path coefficient	Standardized path coefficient	Standard error	Critical ratio	Statistic probability
Profitability → Stock return	0.022	0.010	0.092	0.237	0.813
Growth opportunities → Stock	0.480	0.177	0.106	4.527	0.000
BM → Stock return	-0.147	-0.113	0.050	-2.957	0.003

Second hypothesis: The moderating variable of financial constraint affects the relationship between stock liquidity and stock returns negatively and significantly.

As indicated earlier, in the case of companies classification, companies whose calculated index was greater than the median were classified as the companies with financial constraints, and the rest of companies were identified as the normal cases, emphasizing that each group involves 324 year-company. Ultimately, having grouped the companies by two categories in Amos software, the output of the structural model estimation along with the standardized path coefficients were shown as follows.

**Table 8** Results of structural model analysis followed by group assignment

<b>Companies Group</b>	<b>Variable path</b>	<b>Path coefficient</b>	<b>Standardized path coefficient</b>	<b>Standard error</b>	<b>Critical ratio</b>	<b>Statistic probability</b>
All Companies	liquidity → Stock return	0.002	0.098	0.001	1.977	0.048
Companies with constraint	liquidity → Stock return	0.000	-0.019	0.001	-0.282	0.778
Companies without constraint	liquidity → Stock return	0.003	0.201	0.001	2.684	0.007

The results of the study show that the stock liquidity path to stock return in companies with financial constraints, standardized path coefficient of 0.019, and a probability of 0.778 is not significant at the 95% confidence level and has a critical ratio of -0.282 (within the range of  $\pm 1.96$ ). In other words, in firms with financial constraints, there was no statistically significant relationship between stock liquidity and stock returns. Also, the comparison of the standardized path coefficient of the groups indicates that the severity of the relationship between these variables is different in the two groups so that the relationship between stock liquidity and stock returns in companies with no financial constraints is stronger than constrained companies.

The statistical significance of this issue is also presented in Table 9. According to the results presented in this table, the difference between the two variables of stock liquidity and stock returns in two groups of companies with constraints and without financial constraints is significant at 95% confidence level with a Z-score of -2.167. Therefore, there is no reason to reject the second hypothesis of the study indicating that financial constraints have moderating effect on the relationship between stock liquidity and stock returns, and in the case of companies with financial constraints, the relationship of these variables is affected by existing circumstances.

**Table 9** Results of the second research hypothesis

Variable path	With financial constraint		Without financial constraint		Z-score
	Path coefficient	Statistic probability	Path coefficient	Statistic probability	
liquidity → Stock return	0.000	0.778	0.003	0.007	-2.167**

\*\*\* at 1% error level    \*\* at 5% error level

## 5. CONCLUSIONS AND SUGGESTIONS

In the present study, the relationship between stock liquidity and stock returns, as well as the role of financial constraints in relation to these variables were investigated. The results of the first hypothesis show that stock liquidity has a positive and significant effect on stock returns. In other words, in Tehran Stock Exchange the liquid stock gains more welcome, and public attention, as well as demand for such stocks, has probably led to higher prices and, ultimately, returns, which is consistent with the findings reported by Davallou and Shakerardkani (2016), and Shammakhi and Mehrabi (2016).

The results of the second hypothesis indicate that the effect of stock liquidity on stock returns in companies with financial constraints is different from that of the companies without financial constraints in a way that the effect of stock liquidity on stock return in health companies is stronger than that of the companies with financial constraint. This indicates unhealthy companies

with constraints on providing the financial resources and failure to implement developmental plans, have lower welcome in terms of their stock in the market, and stakeholders would receive lower levels of return in this context. On the other hand, regarding the positive relationship between stock liquidity and stock returns in a healthy company group, it can be stated that in the financial markets, the demand for stocks with high liquidity is higher and this is a factor in increasing stock prices in healthy companies, followed by the fact that stockholders receive more return. Finally, following the results of the research and considering the significant difference in the effect of stock liquidity on stock returns in companies with financial constraints and without financial constraints, it is suggested that capital market activists, financial analysts and potential and actual investors of stock exchanges, take into consideration the conditions and financial constraints of the companies, and do not represent an equal response to the financial data concerning the factors that influence the companies of two groups.

## 6. LIMITATIONS OF THE STUDY

The main aim of the study was to investigate the relationship between stock liquidity and stock returns with a focus on the moderating role of financial constraints. Although the study conducted a thorough survey, there were certain limitations while exploring the aim of the study. It is expected that these points will help future researchers to avoid facing the same shortcomings.

Sample size: Data from 2009 to 2017 is being used for testing. If a larger amount of sample can be taken there is the possibility of different results.

Lack of research: There is no comprehensive research done on the Tehran Stock Exchange about the relationship between stock liquidity and stock returns with a focus on the moderating role of financial constraints.

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