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THE EFFECT OF LIQUIDITY RISK ON STOCK RETURN IN PETROCHEMICAL COMPANIES

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ABSTRACT

Liquidity is the most important aspect of the development of stock markets. The present study evaluates the effect of liquidity risk on stock return in petrochemical companies of the region. The study methodology is descriptive, correlation. The present paper applied the stock return as dependent variable and it is calculated using two criteria of measuring liquidity including the trading turnover ratio and illiquidity measure of Amihud and Amivest and trading turnover. The data of the study is taken from 9 petrochemical companies listed on Tehran Stock Exchange (TSE) during 2011 to 2015. For data analysis, F-Limer test is applied. The results of study show the positive and significant impact of liquidity risk and different criteria of liquidity on stock return.

Keywords: *Liquidity, Stock Return, Liquidity Risk*

INTRODUCTION

Based on the extension of market, there are various tools for investment and the investors choose their asset based on the return and investment risk. One of the basic issues in investment is the liquidity of assets. Liquidity is one of the best features of competitive markets as defined as performing trading rapidly, with low costa and without affecting the price considerably and it is also the main determinant of the continuance of markets. The role of liquidity factor is of great importance in assets valuation as the investors consider that if they sell their assets, they should evaluate whether there is a good market for them or not. The higher the risk of asset, the higher the return for the investor (Kashanipour, 2010).

Statement of problem

The present study attempts to examine the relationship between stock return as the difference between the market return and stock return with liquidity risk. The role of liquidity factor is of great importance in assets valuation as the investors consider that if they sell their assets, they should evaluate whether there is a good market for them or not. The lower the liquidity of a share, the lower the attraction of the share for the investors, unless much return is dedicated to the shareholder (Tehrani, 2011).

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The main problem is that, today in accounting profession, different indices are used to evaluate the performance of business unit and one of these measures is liquidity indicator. The present paper attempts to prove scientifically whether liquidity risk has any impact on stock return in petrochemical companies of Asaluye region or not.

Significance of study

The most important factor for the financial managers in liquidity risk is achieving liquidity and maximizing the company value in the long-term and as the return on asset and stock return are the results of efficiency of activities and exploitation of company via the profit of sale and investment, the evaluation of the relationship between liquidity risk and abnormal return of stock in the companies listed on TSE is the purpose of the present study.

Study purposes

The evaluation of the impact of liquidity risk on stock return in petrochemical companies of Asaluye region

The evaluation of the calculated liquidity based on Amivest measure on stock return in petrochemical companies of Asaluye region

The evaluation of the calculated liquidity based on Amihud measure on stock return in petrochemical companies of Asaluye region

The evaluation of the calculated liquidity based on trading turnover on stock return in petrochemical companies of Asaluye region

Study hypotheses

Main hypothesis

1- There is a significant relationship between liquidity risk and stock return in petrochemical companies of Asaluye region

Sub-hypotheses

1- There is a significant relationship between liquidity risk and stock return in petrochemical companies of Asaluye region
2- There is a significant relationship between calculated liquidity based on Amivest measure and stock return in petrochemical companies of Asaluye region
3- There is a significant relationship between calculated liquidity based on Amihud measure and stock return in petrochemical companies of Asaluye region
4- There is a significant relationship between calculated liquidity based on trading turnover and stock return in petrochemical companies of Asaluye region

Study questions

Main question

1- Is there any significant relationship between liquidity risk and stock return in petrochemical companies of Asaluye region?

Sub-questions

1- Is there any significant relationship between liquidity risk and stock return in petrochemical companies of Asaluye region
2- Is there any significant relationship between calculated liquidity based on Amivest measure and stock return in petrochemical companies of Asaluye region
3- Is there any significant relationship between calculated liquidity based on Amihud measure and stock return in petrochemical companies of Asaluye region

4- Is there any significant relationship between calculated liquidity based on trading turnover and stock return in petrochemical companies of Asaluye region

REVIEW OF LITERATURE

Local studies

Mohammad Nofersti (1999) evaluated the liquidity condition in textile industry companies with the study population of 23 textile companies during 1994-1996. The study evaluated the problems of textile industry from financial aspects and applied the basic financial statements to compute the financial ratios. The indices of the effective factors on liquidity don't show significant difference during the studied years.

Yahyazade and Khoramdin (2008) carried out a study "the problems of liquidity and financing in stock market companies of Mashhad with the study population of 50 companies during 2002-2006. Based on the abnormal return of the financing companies to remove the problem of liquidity shortage based on the volatility of return rate, it was shown that financing namely via new stock issuing had a positive impact on the mind of stock buyers. Indeed, Iranian shareholders had a positive reaction to the mentioned event.

Susan Sadat Aghili Nouri (2001) in a study "Evaluation of the liquidity condition in Mashhad stock market companies" raised four special hypotheses. First hypothesis: the shortage of liquidity was associated with the high level of goods inventory. Second hypothesis: Liquidity shortage was related with the weakness in short-term financing. Third hypothesis: The shortage of liquidity was associated with great investment in pre-payments. Fourth hypothesis: Liquidity shortage was related to the long period of claims collection. She found that all the study hypotheses were supported.

Mehrani (2009) evaluated the relationship between the illiquidity risk measures and excess stock return in TSE. He found that adding liquidity variable or illiquidity risk premium to the standard model of pricing capital assets increased the model ability to explain the relationship between risk and return.

Foreign studies

Ellul & Pagano (2007) believe that the firm size as liquidity measure has a negative and significant impact on the return of companies. They stated that the companies with high (low) book value to market value, are weak (strong) and the investors need return premium to compensate the excess risk via the stock holding of the companies reduced book value to market value ratio and the stock has high risk as the return changes are increased.

Zhang, F., Tian, Y. & Wirjanto, (2007) applied the turnover ratio as proposed by Amihud and Mandelson in 2002 as an indicator for liquidity. They found that liquidity had significant role in explaining the cross sectional changes of stock return. They applied the control factors such as firm size, book to market value and market return.

Melitz, M. J., & Ottaviano (2008) studied the relationship between liquidity management and the results of performance and between liquidity management and company value on Japanese and Taiwan companies. Generally, high liquidity management increased the results of performance and high company value in countries despite the differences in the structural features of companies or their financial system. In addition, the statistical results showed that liquidity management for the sum of Japanese and Taiwan companies as divided based on the

type of industry showed the lowest value of liquidity in food industry and the highest liquidity value in services industry.

Chordia (2000) believed that one of the logical hypotheses showed that risk was related to liquidity changes and liquidity level was effective on return on asset. The study evaluated the relationship between the expected return of stock and volatilities of trading activities as an indicator for liquidity. Also, the relationship between stock return and volatilities of trading volume was evaluated with the control of factors such as size and book to market ratio. The results of study showed that there was a negative relationship between stock return and volatilities of trading volume.

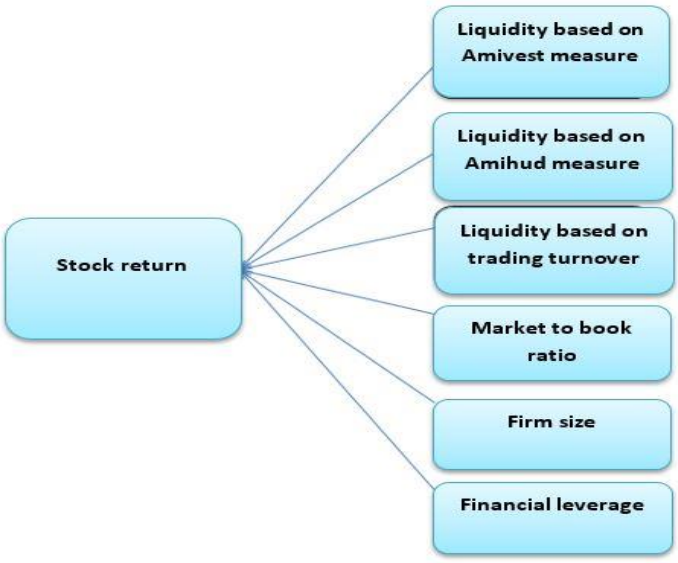
Chai et al., (2010) in a study "floating stock and market liquidity" in Hong Kong stock market evaluated the relationship between floating stock and market liquidity after the government intervention in stock market of Hong Kong and found that the government intervention in Hong Kong stock market reduced the floating stock and trading volume of micro stock was reduced and the stagnant liquidity was increased in market.

Amihud (2002) stated that the expected illiquidity of market had a positive relationship with the predicted return excess of stock. He stated that a part of expected return excess was stated by illiquidity premium. Illiquidity criterion was the absolute value of stock return to the trading volume in dollar. He also claimed that illiquidity had high impact on stock premium of the small firms.

Chan (2003) applied the impact of liquidity in asset in Australian market using turnover rate in assets pricing as cross section. They applied the monthly data and control factors such as book to market ratio, firm size and market return excess. Using cross sectional regression, he evaluated the effect of liquidity (stock turnover ratio) in assets pricing in Australian market using monthly data and control factors such as book to market value, firm size and excess market value.

The conceptual model of study

Based on the theoretical basics, the local and foreign studies and the guidance of professors, the conceptual model of the study is as follows:



STUDY METHOD

The present study is an applied design in terms of purpose and the results can be used by the managers, investors and users. In terms of study method, it is correlation to evaluate the impact of liquidity risk on stock return in the petrochemical companies listed on TSE.

Study model

Based on the theoretical basics, the local and foreign studies and views of professors, the applied model to test the hypotheses is as follows:

$$SR= \beta_0+ \beta_1(RL)+ \beta_2(LA) +\beta_3(LAA)+ \beta_4(LT)+ \beta_5(MTB)+ \beta_6(SIZE) + \beta_7(FL) + \varepsilon$$

Stock return (SR)

It is a part of stock return higher than the return predicted by the market volatilities. In other words, abnormal return of stock is the difference between market return from stock return.

Liquidity risk (RL):

It is based on dividing the mean of floating share by the number of floating share. The floating share of each company is calculated by the percentage of floating stock issued by stock market and its multiplication by the last number of stocks. The stock with high liquidity has lower liquidity risk.

Liquidity based on Amivest index (LA):

$$\text{Liquidity Amivestit} = \frac{\textbf{Trading value}}{\textbf{absolute value of stock return}}$$

Liquidity based on Amihud measure (LAA):

$$\text{Liquidity Amihudit} = \frac{\textbf{absolute value of stock return}}{\textbf{Trading volume}}$$

Liquidity based on trading turnover (LT):

$$\text{Liquidity Tourit} = \frac{\textbf{The number of traded stock}}{\textbf{The number of issued stocks}}$$

Market to book ratio (MTB)

The market value of each share to book value of each share.

Firm size (SIZE)

The natural logarithm of total assets

Financial leverage (FL):

Debt to total assets ratio

1-1 The study population and sample

The study population is all petrochemical companies listed on TSE during the period 2011 to 2015. The companies should meet the following criteria to be participated in the study.

1- Be listed on TSE from the beginning of 2011.
2- There is no fiscal year change during the study period.
3- The required data are available from different resources.

Based on these conditions, the companies which are available in terms of the above criteria and convenient sampling method is used to do this. Finally, 9 companies were selected as the sample of study.

Data analysis method and hypotheses testing

For data analysis, based on the multi-variate regression model in this stage, the required data were designed and completed using Excel software. For the statistical analysis of data, Eviews software was applied.

Statistical methods

Generally, the analysis methods of study data include F limer's test, Hausman and significance of model. The mentioned tests and their application in each of study hypotheses include as the followings:

Descriptive statistics

In this section, by descriptive statistics, different measures of dispersion and central measures of each variable in each year and their mean for all years were expressed. These tables show only the limit of the applied variables in the study.

Table 1: Descriptive statistics

SD	Min	Max	Median	Mean	
۳/۶۴	-۱/۳۳	۸/۴۱	-۰/۱۲	۰/۹۳	SR
۱/۴۶	۰/۱۳	۱۲/۰۰	۱/۰۰	۱/۴۵	RL
۱/۵۵	۲/۰۱	۴/۳۰	۱/۱۰	۱/۲۸	LA
۰/۰۴۴	-۰/۰۰۵	۰/۱۵	۰/۰۲۰	۰/۰۲۷	LAA
۰/۷۷	۰/۰۲۴	۱/۵	۰/۰۷۱	۰/۰۲۱	LT
۰/۶۹	-۶/۴۸	۴/۳۵	۰/۵۹	۰/۷۱	MTB
۱/۴۵	۹/۴۴	۱۷/۶۴	۱۲/۷۵	۱۲/۸۲	SIZE
۰/۲۲	۰/۱۲	۰/۷۸	۰/۴۲	۰/۳۴	FL

Source: Results of study

Reliability test of variables

Before the estimation of the effect of liquidity risk on stock return in petrochemical companies, it is required to test the reliability of all applied variables in the estimation as the non-reliability of variables leads to the problem of spurious regression estimation.

Table 2: The reliability of variables

PP - Fisher Chi-square	Levin, Lin & Chu t	Variable
۳۳۳/۶۱۷ ۰/۰۰۱	-۱۵/۸۰۲ ۰/۰۰۱	SR
۴۶۹/۶۱۷ ۰/۰۰۱	-۲۴/۱۶۷ ۰/۰۰۱	RL
۲۷۹/۲۶۳ ۰/۰۰۱	۰/۲۸۵۶ ۰/۰۰۱	LA
۲۷۹/۶۴۲ ۰/۰۰۱	-۲۸/۲۰۱ ۰/۰۰۱	LAA
۸۵۰/۹۸۵ ۰/۰۰۱	-۴۵/۵۸۸ ۰/۰۰۱	LT
۳۳۶/۹۴۱ ۰/۰۰۱	-۱۵/۸۴۵ ۰/۰۰۱	SIZE

۱۸۰/۱۱۶ ۰/۰۰۱	-۸/۲۷۰ ۰/۰۰۱	FL
۵۶۷/۰۱۷ ۰/۰۰۱	-۳۷/۲۵۹ ۰/۰۰۱	MTB

Source: Results of study

In reliability test of panel data, the variables are reliable if the probability level is lower than 0.05 at least in two cases of tests. To be sure of the reliability of data, Levin, Lin & Chu t و PP - Fisher Chi-square tests were used and the results of the test are shown in Table 2. Based on the results, the collective reliability of the applied variables was supported at the confidence interval 95%.

The empirical results of study

Before the model estimation, at first F-Limer and Hausman tests are performed.

F-Limer test

As it was said in the third chapter, if the achieved F is higher than F of Table or its probability is smaller than 0.05, panel data method is used, otherwise pooled data method is used. As shown in Table 3, the probability of F-Limer test is 0.00 as less than 0.05 and panel data method is applied.

Table 3: The results of F-Limer test

Probability	Test statistics	F-limer
۰/۰۰۱	۳۲/۰۳۸۶	

By Hausman test, it is shown that the suitable analysis method is random or fixed effects method.

Hausman test:

To determine fixed or random effects methods, Huasman test is performed. Based on the results of test, the calculated F probability is 0.001 (Table 4), thus fixed effects method is used. The results of Limer and Hausman tests show that the study model is estimated by panel data-fixed effect method. The result of study hypothesis is shown in Table 5. The complete results of estimated model based on panel data-fixed effects method are shown in the attachment.

Table 4: The results of Hausman test

Probability	Test statistics	Hausman test
۰/۰۰۱	۳۷/۱۳۹۳	

Source: Results of study

As it was said, the present study evaluates the impact of liquidity risk on stock return in Petrochemical companies listed on TSE. To do this, a main hypothesis and three special hypotheses are formulated and they are fitted and estimated:

Main hypothesis test

H0: There is no significant relationship between liquidity risk and stock return in petrochemical companies.

H1: There is a significant relationship between liquidity risk and stock return in petrochemical companies.

To test the study hypotheses, multi-variate regression model is applied.

$$SR= \beta_0+ \beta_1(RL)+ \beta_2(LA) +\beta_3(LAA)+ \beta_4(LT)+ \beta_5(MTB)+ \beta_6(SIZE) + \beta_7(FL) + \varepsilon$$

The above hypotheses are shown statistically:

$$\begin{cases} H_0: \beta_i = 0 \\ H_1: \text{At least, one of the coefficients of variables is non-zero} \end{cases}$$

Indeed, H0 indicates that none of the independent variables in regression model is significant and H1 shows that at least one of the independent variables in regression model is significant. Later, the results of main hypothesis test are expressed and analyzed.

The results of estimation of first hypothesis are as follows:

a. As shown in the following Table, F statistics probability is 0.001. As this value is less than the standard error level, 0.05, H0 regarding the non-significance of the relationship between independent and dependent variables is rejected. We can say, the estimated model is significant at the error level 5%.
b. T statistics and its probability to analyze the independent variables (liquidity risk, liquidity based on Amivest measure, liquidity based on Amihud measure and liquidity based on trading turnover) and control (firm size, financial leverage and market to book ratio) showed the effect of variables on dependent variable (stock return) are applied. Based on the significance level of liquidity risk variable (0.00001) as less than 0.05 and there is a significant relationship with stock return. Due to the positive ratio of this coefficient of independent variable (0.06), we can say there is a positive and significant relationship between liquidity risk and stock return.
H0: The coefficients are not significant, if the significance level of coefficients is higher than 0.05.
H1: The coefficients are significant, if the significance level of coefficients is less than 0.05.
With the evaluation of the significance level of control variables, we found that the firm size had no significant relationship with stock return, it means that the significance level of variable (0.7694) is higher than 0.05. Also, financial leverage has a negative and significant relationship with stock return as its significance level (0.0001) and its coefficient is (-0.4354). On the other hand, the significance level of MTB is 0.0035 and there is a positive and significant relationship as its coefficient is 0.1269.
c. Coefficient of determination indicates the explanation and prediction power in dependent variable (stock return) as explained by the regression. This value for the main hypothesis is 68.24%.
d. Durbin-Watson statistics is 1.8769. As this value is ranging 1.5 to 2.5, it shows non-auto correlation of the model. It means that there is no relationship between the error terms in different observation (companies).

Table 5: The results of hypotheses testing

Significance level	T statistics	Coefficients	Dependent variable: Stock return
			Study variables
۰/۰۰۰۱	۹/۸۹۵	۰/۸۳۱	Constant coefficient
۰/۰۰۰۱	۸/۸۲۹	۰/۰۶۵۳	RL
۰/۰۳۲۵	۲/۱۵۰	۰/۱۰۵۵	LA
۰/۰۰۰۷	۳/۶۱۸	۰/۰۹۶۷	LAA

۰/۰۱۶۰	۲/۴۴۱	۰/۰۶۳۱	LT		
۰/۰۰۳۵	۲/۸۶۹	۰/۱۲۶۹	MTB		
۰/۷۶۹۴	۰/۲۹۳۷	۰/۰۰۳۸	SIZE		
۰/۰۰۰۱	-۷/۹۰۷۸	-۰/۴۳۵۴	FL		
۱/۸۷۶۹	Durbin-Watson statistics	۰/۶۷۵۸	Adjusted coefficient of determination ۰/۲۳۵	۰/۶۸۲۴	Coefficient of determination
۰/۰۰۱	F significance level	۶۷/۸۴۸۲	F statistics		

Source: Results of study

Based on the results of statistical analysis, there is a positive, direct and significant relationship between liquidity risk and stock return, it means that by the increase of liquidity risk, stock return is increased and vice versa. Thus, H0 is rejected and H1 is supported. It means that the main hypothesis of study is supported as the coefficient of liquidity risk is significant.

First sub-hypothesis test

H0: There is no significant relationship between calculated liquidity based on Amivest measure and stock return in petrochemical companies.

H1: There is a significant relationship between calculated liquidity based on Amivest measure and stock return in petrochemical companies.

T statistics and its probability to analyze the independent variable of liquidity independent variable based on Amivest measure show the effect of this variable on dependent variable. Based on the significance level of liquidity variable calculated based on Amivest measure (0.0325) is less than 0.05. We can say, there is a significant relationship with stock return. Due to the positive value of independent variable coefficient (0.10), we can say there is a positive and significant relationship between the calculated liquidity based on Amivest index and stock return.

Based on the results of statistical analysis, there is a significant relationship between the calculated liquidity based on Amivest measure and stock return as positive and direct, it means that with the increase of calculated liquidity based on Amivest measure, stock return is increased and vice versa. Thus, H0 is rejected and H1 is supported. It means that second hypothesis is supported as the calculated liquidity coefficient is significant based on Amivest measure.

Second sub-hypothesis test

H0: There is no significant relationship between the liquidity calculated based on Amihud index and stock return in the petrochemical companies.

H1: There is a significant relationship between the liquidity calculated based on Amihud index and stock return in the petrochemical companies.

Based on the significance level of Amihud liquidity variable (0.0007) less than 0.05, we can say there is a significant relationship with stock return. Due to the positive coefficient of Amihud liquidity variable (0.09), we can say there is a positive and significant relationship between Amihud liquidity and stock return.

Based on the results of statistical analysis, there is a positive, direct and significant relationship between Amihud liquidity and stock return. It means that by the increase of Amihud liquidity,

stock return is increased and vice versa. Thus, H0 is rejected and H1 is supported. It means that the second sub-hypothesis is supported as the liquidity coefficient of Amihud is significant.

Third sub-hypothesis test

H0: There is no significant relationship between the liquidity calculated based on trading turnover and stock return in the petrochemical companies.

H1: There is a significant relationship between the liquidity calculated based on trading turnover and stock return in the petrochemical companies.

Based on the significance level of liquidity variable based on trading turnover (0.0160) less than 0.05, we can say that there is a significant relationship with stock return. Due to the positive value of independent variable (0.0631), we can say there is a positive and significant relationship between liquidity based on trading turnover and stock return.

Based on the results of statistical analysis, there is a positive, direct and significant relationship between liquidity based on trading turnover and stock return. It means that with the increase of liquidity based on trading turnover, stock return is increased and vice versa. Thus, H0 is rejected and H1 is supported. It means that the third sub-hypothesis is supported, as liquidity coefficient based on trading turnover is significant.

CONCLUSION

In each financial market, based on the extension and depth of market, there are various tools for investment. One of the basic issues in investment is the assets liquidity as some of the investors need the financial resources of their investment. The speed of stock liquidity is related to the acceptance of trading in stock market by the investors.

Based on the results of stud y and the positive and significant effect of liquidity risk and different criteria of liquidity on stock return, we can say the speed and liquidity ability of asset are important factors in the investment decisions in capital market. In selection of investment choices, the investors consider their liquidity besides the risk and return. The effect of this feature from securities on the variables of capital market is the subject of most of financial researches. In the present study, there is a direct relationship between stock liquidity and return in the required period. It means that by using stock with high liquidity, high return is concluded.

Recommendations of study

It is recommended to the investors and managers of stock portfolio, investment companies and other authorities of capital market to not only consider the systematic risk as the explanatory variable of return during the stock purchase and the analysis of the relationship between risk and return. Considering some factors including the size, stock liquidity and book to market value ignoring market factor can improve decision making power.

Based on the main duty of the managers as the improvement of the capital of shareholders as maximum, the managers should mostly focus on stock liquidity and perform the solutions to increase liquidity to increase the capital of stock holders.

Limitations of study

- Besides the applied variables in the model, the stock return under the impact of some variables including the political and economic conditions is not considered in this study.

- The present study is carried out based on the data of 9 petrochemical companies. Thus, the results are not generalized to all firms.

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