Review of the Relationship between Investment and Stock Liquidity Level of Companies Listed in Tehran Stock Exchange (With Emphasis on Industry Type)

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Abstract

The purpose of this research is to review the effect of stock liquidity on the level of investment in companies listed in Tehran stock exchange in 2006-2011 time period. A number of 168 companies were reviewed in mentioned time period in order to perform this research. Pooled regression model and Wald test were used in Eviews 6 to test the research assumptions. In this research, industry-based adjusted trading volume was used to specify the liquidity of stocks. Dependent variable is the level of future investments that for calculating it 3 standards were used: growth of total assets, growth of fixed assets, and growth of inventory. Moreover, financial leverage, Q-tobin ratio, cash amount, and industry type have been used as control variables.The research findings indicate that the impact of industry-based adjusted trading volume on future growth of total inventory, is negative and significant. Other results indicate that the impact of Q-tobin ratio on future growth of total assets and future growth of total fixed assets, is positive and significant.

Keywords: investment, growth of total assets, growth of fixed assets, inventory growth, liquidity.

1. Introduction

Investment and its related issues, are one of the most significant factors which affects the economy of every country. Since investment is a factor for production, occupation, and mobilization of economic wheels of every country, it is inevitable. Investment is done through different ways, stock exchange is one of these ways.

Since stock liquidity means the ability of trading stocks with low costs, this criteria is one of the most important issues which is cinsidered when choosing investment opportunities, so investors select the companies which have a high degree of liquidity.

2. Theories and history of research

liquidity is considered as one of the most significant dimensions of optimum allocation of resources.this variable indicates that in a certain period, to which exent the stocks of companies available on trading board can be traded, how hard or how easy they have traded their stocks. Liquidity of assets is simply defined as the ability of market to absorb high volume of trades without creation of intense fluctuations in price.

Butler et al. (2005) and Lipson and Mortal (2009) study the relationship between liquidity and equity issuance decision, finding that firms with greater liquidity have lower issuance costs, thus using more funding through the issue of shares. In this manner, firms with higher liquidity tend to have lower levels of leverage. Moreover, Lesmond et al.(2008) find firms that increase their level of leverage increase the bid-ask spread (reduced liquidity). Similarly, Bharath et al.(2009) show that firms that use a higher percentage of financing through debt, have lower liquidity in the stock market. Fang et al. (2009) focuses on the relationship between liquidity and firm performance, finding that firms with greater liquidity have a better performance measured as the market-to-book ratio of assets. Gilchrist et al. (2005) finds that greater variance in the predictions of stock market analysts predicts greater actual investment and equity issuance, which is literature that is more related to my findings. Similarly, Polk and Sapienza (2009) find, using firm level data for the US, that the investment is larger when the shares are overvalued, using discretionary accruals as a proxy for mispricing.1 Fang et al. (2012) studies the relation between stock market liquidity and firm innovation (which is related with long-term investment). They find that an increase in liquidity leads to a higher level of institutional ownership by transient and quasi-indexers which reduces innovation. Thus, they found a negative relationship between innovation (long-term investment) and stock market liquidity.

Francisco Munoz (2013) in his article named 'liquidity and investment of company' reviewed the relationship between company actual investment and liquidity of stock market for a group of companies listed in stock exchange in Argantina, Brazil, Chile, and Mexico in 1990-2010 time period. He uses two criteria of

liquidity in the form of trading volume in one period (seasonal), and adjusted trading volume based on industry, and measures the impact of these on the growth of fixed assets, inventory and growth of total assets. He has used financial leverage, Q-tobin and cash flow as control variables to control other variables which are somehow effective on analysis of research issue. He concluded that in companies with high level of trading volume in one period and industry-based adjusted trading volume, the level of investment is high as well. So, liquidity of stock market has a direct relationship with companie`s investment, and high liquidity can result in more investments.

Main assumption: the impact of stock liquidity on level of investments of companies in various industries, is different.
Secondary assumption are as follow:
1. the impact of stock liquidity on the growth of total assets in various industries, is different.
2. the impact of stock liquty on the growth of fixed assets in various industries, is different.
3. the impact of stock liquidity on inventory in various industries, is different.

Research variables
1. Independent variable: in this research, stock liquidity is considered as independent variable that industry-based adjusted trading volume
is used to measure it.
Industry-based adjusted trading volume: this variable is calculated through dividing trading vaolume of each company in different industries into trading volume of the same industry.
2. Dependent variable: the level of investment is considered as dependent variable, that three below criteria will be used to measure it.
a) growth of total assets, b) growth of fixed assets, c) investment level.
3. Control variables: this variable as other effective factor on the level of investment includes:
1. Financial leverage: this variable is determined as below:
$LEV_{it} = TL_{it} / TA_{it}$
In which we have:
LEV_{it}= financial leverage of company i at the end of financial year t
TL_{it}= total debts of company i at the end of financial year t
TA_{it}= total assets of company i at the end of financial year t
2. Q-tobin ratio: this variable is calculated through dividing market value of company to book value of company or replacement value of company assets.
If the calculated index for company is more than 1, there is high intentions for investment. If the calculated index is lower than 1, the investment will be stopped (Wolf, 2003).
The same definitions have been used in works of Kerent et al. (2007), and Al Yasiani & John Jia (2008), for this variable.
3. The level of Cash: to calculate this variable, cash flow resulting from company operational activities at the end of financial year is divided to total assets of company at the end of financial period.
4. Industry type: in this research, to test the assumptions in different industries, 5 main industries which have the most amount of companies in the sample being reviewed, are examined.

Data collection method
Information required for this research were extracted from Rah Avard and stock exchange website (www.rdis.ir).

Research population, sampling method, and sample volume
Population of this research includes total companies listed in Tehran stock exchange in 2006-2011 time period, which have below qualifications:
1. They are listed in Tehran stock exchange up to the end of March 2005, and their financial year ends in March of each year.
2. Company has not changed its financial year in mentioned time period.
3. They have been active in mentioned time period, and their stocks are traded.
4. They have totally provided the required financial information in 2006-2011 time period.
5. They are not investment companies, banks or financial intermediates.
Screening method has been used in this research to determine the statistical sample, so that companies with above mentioned qualifications are selected and the rest are removed.
Considering the qualifications, a number of 168 companies were selected as sample.

Research analysis and assumption testing methods
To analyze data, different tests will be used including descriptive indexes in descriptive statistics section, and

statistical tests in inferential statistics section.

Statistical tests which are used in inferential statistics section, include: correlation test, T-tests, and multi-variable linear regression. Correlation coefficient is used not only in testing the assumptions, but also in measuring the relationship between dependent and independent variables, that is; the effectiveness coefficient of independent variables and relationship type (negative or positive coefficient).

Among different available analysis methods, pooled/plan data method is used in this research, and in order to test the main assumption and its relevant secondary assumptions (that is; to review the relationship between liquidity o stocks and investment), 3 regression models are estimated in pooled/plan mode in the level of total companies, as below:

$$INVEST_{it+1} = \beta_0 + \beta_1 * LIQ_{it} + \beta_2 * LEV_{it} + \beta_3 * QTOBIN_{it} + \beta_4 * CF_{it} + \varepsilon_{it}$$

In which, we have:

$INVEST_{it+1}$= The level of investment at the end of financial year t+1 for company i, that 3 criteria are used to calculate it (1. Growth of total assets, 2. Growth of ixed assets, and 3. Growth of inventory).

LIQ_{it}= the liquidity level of stocks of company i at the end of financial year t, that industry-based adjusted trading volume is used to calculate it.

LEV_it= financial leverage of company i at the end of financial year t

CF_it= the level of cash in company i at the end of financial year t

ε_it= regression residual of company i at the end of financial year t

In this research, in order to review the difference between the impact of stock liquidity on the level of investment in companies listed in Tehran stock exchange in different industries and its secondary assumptions, Wald test was used in below regression relationships:

$$INVEST_{it+1} = \beta_0 + \beta_1 * LIQ_{it} + \beta_2 * Ind1 * LIQ_{it} + \beta_3 * Ind2 * LIQ_{it}$$
$$+ \beta_4 * Ind3 * LIQ_{it} + \beta_5 * Ind4 * LIQ_{it} + \beta_6 * Ind5 * LIQ_{it}$$
$$+ \beta_7 * LEV_{it} + \beta_8 * QTOBIN_{it} + \beta_9 * CF_{it} + \varepsilon_{it}$$

In which, we have:

Ind1= dummy variable of the first big industry, being reviewed.

Ind2= dummy variable of the second big industry, being reviewed.

Ind3= dummy variable of the third big industry, being reviewed.

Ind4= dummy variable of the fourth big industry, being reviewed.

Ind5= dummy variable of the fifth big industry, being reviewed.

Zero assumption of Wald test, is as follow:

$\beta\_2=\beta\_3=\beta\_4=\beta\_5=\beta\_6$

If zero assumption of Wald test is rejected (that is; the possibility of Wald test is less than 5%), the main assumption and its relating secondary assumptions are confirmed.

Before estimation of regression models in all above modes, to test the research assumptions, firstly an appropriate pattern is selected for regression model through F-Limer test.

In all statistical techniques, EXCEL and Eviews are used.

In order to determine that research variables are normal in Eviews, Jarque-Bera test is used. In order to determine the stability of research variables, Levin, Lin & Chu test is used. The results of this test indicate that independent, dependent and control variables have been stable during research period, because P-Value has been less than 5% or mentioned test.

Testing the first research assumption

The impact of stock liquidity on the growth of total assets is different in different industries.

The results indicate that the impact of industry-based adjusted trading volume on the growth of total assets has not significant in non of industries being reviewed.

Other results indicate the positive impact of Q-tobin ratio on the growth of total assets.

Results regarding F test indicate that the model is signiicant in general, and according to Doorbin-Watson test is has no self-correlation problem.

Values of regression residuals of mentioned model have Jarque-Bera test equal to 1.941, and possibility of Jarque-Bera test equal to 0.379, which indicate that regression residuals are normal.

Moreover, the results regarding the adjusted coefficient of changes indicate that about 2% o changes in the growth of total assets has been affected by industry-based adjusted trading volume and control variables namely Q-tobin test.

Tests variables	Regression coefficients	Value of t test	Possibility of t test
Fixed amount	0.07	1.97	0.0490
Industry-based adjusted trading volume	-0.006	-0.022	0.8281
Industry-based adjusted trading volume in car industry	-0.07	-0.30	0.7631
Industry-based adjusted trading volume in chemical industry	0.23	1.22	0.2219
Industry-based adjusted trading volume in food industry except for sugar	0.19	1.47	0.1415
Industry-based adjusted trading volume in basic metals industry	0.19	1.12	0.2641
Industry-based adjusted trading volume in medical matrials industry	0.24	0.99	0.3232
Financial leverage	-0.005	-0.10	0.9176
Q-tobin ratio	0.05	3.99	0.0001
Cash level	0.03	0.55	0.5825
Determination coefficient	Adjusted determination coefficient	Possibility of F test	Doorbin-Watson test
0.029	0.020	0.0005	2.085

The results of Wald test to test the first secondary assumption, indicate that there is no significant difference between impact level of industry-based adjusted trading vollume on the growth of total assets in 5 big industries being reviewed.

Since there is no significant difference between the impact of industry-based adjusted trading volume on the growth of total assets in 5 big industries being reviewed, the first secondary assumption is not confirmed.

Table 2. the results of Wald test for testing the first secondary assumption of the second main assumption, in the level of industry-based adjusted trading volume

Tests Comparison type	Value of F test in Wald test	Freedom degree	Possibility of F test in Wald test	Test result
All industries	0.356	4	0.8399	No significant difference

The results shown in table 3 indicate that the impact of industry-based adjusted trading volume on the growth of total assets has been positive and significant only in chemical industries, except for sugar industry.

Other results indicates that the impact of Q-tobin on the growth of total fixed assets, is positive.

Results regarding to F test indicate that this model is significant in general, and according to Doorbin-Watson test, it has no self-correlation problem.

The values of regression residuals of the mentioned model has Jarque-Bera test equal to 1.363, and possibility of Jarque-Bera test equal to 0.506, which indicate that regression residuals are normal.

Moreover, results regarding to adjusted determination coefficient indicate that about 2.2% of changes in the growth of total fixed assets is affected by the impact of industry-based adjusted trading volume and control variables specially Q-tobin ratio.

Table 3. regression model of the impact of industry-based adjusted trading volume on the growth of total fixed assets in 5 big industries

Tests Variables	Regression coefficients	Value of t test	Possibility of t test
Fixed amount	0.05	0.70	0.4822
Industry-based adjusted trading volume	-0.04	-0.73	0.4646
Industry-based adjusted trading volume in car industry	-0.26	-0.61	0.5452
Industry-based adjusted trading volume in chemical industry	1.03	2.78	0.0055
Industry-based adjusted trading volume in food industry except for sugar	0.68	2.74	0.0063
Industry-based adjusted trading volume in basic metals industry	0.49	1.48	0.1384
Industry-based adjusted trading volume in medical matrials industry	-0.08	-0.17	0.8653
Financial leverage	-0.03	-0.37	0.7135
Q-tobin ratio	0.07	3.01	0.0027
Cash level	0.03	0.25	0.8010
Determination coefficient	Adjusted determination coefficient	Possibility of F test	Doorbin-Watson test
0.031	0.022	0.0002	2.226

The results of Wald test for testing the second secondary assumption, indicate that there is no significant difference between the level of industry-based adjusted trading volume on the growth of total fixed

assets.

Since there is no significant difference between the impact of industry-based adjusted trading volume on the growth of total fixed assets in 5 big industries, the second secondary assumption is not confirmed.

Table 4. the results of Wald test for testing the second secondary assumptio in the level of industry-based adjusted trading volume

tests Comparison type	Value of F test in Wald test	Freedom degree	Possibility of F test in Wald test	Test result
All industries	1.884	4	0.1111	No significant difference

The results indicate that the impact of industry-based adjusted trading volume on inventory growth, has been significant in non of the industries being reviewed.

Results regarding F test indicate that this model in general has not been significant, but according to Doorbin-Watson test, it has no self-correlation problem.

The values of regression residuals of mentioned model has Jarque-Bera test equal to 0.364, and possibility of Jarque-Bera test equal to 0.833, which indicate that regression residuals are normal.

Moreover, results regarding to adjusted determination coefficient indicate that about 0.3% of changes in inventory growth is affected by the impact of industry-based adjusted trading volume and control variables.

Table 5. regression model of the impact of industry-based adjusted trading volume on inventory growth in 5 big industries

Tests Variables	Regression coefficients	Value of t test	Possibility of t test
Fixed amount	0.18	2.30	0.0219
Industry-based adjusted trading volume	-0.13	-2.38	0.0174
Industry-based adjusted trading volume in car industry	0.28	0.63	0.5291
Industry-based adjusted trading volume in chemical industry	0.16	0.40	0.6913
Industry-based adjusted trading volume in food industry except for sugar	-0.11	-0.42	0.6734
Industry-based adjusted trading volume in basic metals industry	0.45	1.30	0.1946
Industry-based adjusted trading volume in medical matrials industry	0.18	0.35	0.7256
Financial leverage	-0.04	-0.48	0.6339
Q-tobin ratio	0.04	1.61	0.1071
Cash level	-0.002	-0.01	0.9896
Determination coefficient	Adjusted determination coefficient	Possibility of F test	Doorbin-Watson test
0.011	0.003	0.2431	2.427

The results of Wald test for testing the third secondary assumption, indicate that there is no significant difference between the level of industry-based adjusted trading volume on inventory growth in 5 big industries, being reviewed.

Since there is no significant difference between the impact of industry-based trading volume on inventory growth in 5 big industries being reviewed, the third secondary assumption is not confirmed.

Table 6. the results of Wald test for testing the third secondary assumption in the level of industry-based adjustrd trading volume

tests Comparison type	Value of F test in Wald test	Freedom degree	Possibility of F test in Wald test	Test result
All industries	0.469	4 & 998	0.7588	No significant difference

Overal conclusions before testing the assumptions

1. all independent, dependent and control variables have been stable in research time period.

2. stock liquidity comparing to different standards of investment (growth of total assets, growth of fixed assets, and inventory growth), has had lowercoefficient of changes and scattering and subsequently higher stability. It indicates that investment level should be affected by other factors other than different criteria of stock liquidity, that some of them are named as control variables in this research.

3. Among control variables, financial leverage has had the lowest, and the level of cash has had the highest level of coefficient of changes and scattering in research period, which is the indicator of relative stability of debt level in capital structure of companies being reviewed, and high scattering in the level of operational cash level of companies according to a percentage of total assets.

4. The results of Jarque-Bera test indicate that dependent variables have been normal in research period.

5. There has been a negative and significant correlation between inventory growth and industry-based adjusted trading volume. As the share of companies` trades in industry increases, the investment level in invevtory growth decreases significantly.

6. Moreover, the correlation results indicate that there is a negative and significant correlation between financial leverage with industry-based adjusted trading volume, Q-tobin ratio, and cash level. It indicates that the level of trading volume, value of stock market, and operational cash level in companies with higher financial leverage (companies which have high debt ratio in their capital structure) are low.

7. positive and significant correlation between Q-tobin ratio and cash level, indicates that on the opinion of participants in stock market, the level of operational cash is an important and determinant factor in icrease of stock market price and subsequently, improvement in Q-tobin test.

Conclusions resulted from the first secondary assumption

The impact of industry-based adjusted trading volume on the growth of total assets, has been significant in non of the industries being reviewed. There is no significant difference between the level of industry-based adjusted trading volume on the growth of total assets in 5 big industries being reviewed. So, the first secondary assumption is not confirmed.

Conclusions resulting from the second secondary assumption

The impact of industry-based adjusted trading volume on the growth of total fixed assets in chemical industries, except for sugar industry, has been positive and significant. There has been no significant difference between the impact level of industry-based adjusted trading volume on the growth of total fixed assets in 5 big industries being reviewed. So, the second secondary assumption is not confirmed.

Conclusions resulted from the third secondary assumption

The impact of industry-based adjusted trading volume on inventory growth, has been significant in non of industries being reviewed. There has been no significant difference between the impact level of industry-based adjusted trading volume on inventory growth in 5 big industries being reviewed. So, the thir secondary assumption is not confirmed.

Recommendations resulted from research findings

1. since there is a positive and significant correlation between Q-tobin ratio and cash level, it seems that on the opinion of participants in stock market, the level of operational cash is an important and determinant factor in icrease of stock market price and subsequently, improvement in Q-tobin test. So, it is recommended to the managers of companies listed in Tehran stock exchange to pay more attention to presenting information regarding cash flow aspecially in operational activities.

2. Sincethere is a negative and significant correlation between financial leverage with industry-based adjusted trading volume, Q-tobin ratio, and cash level, it seems that companies with higher financial leverage have lower trading volume, value of stock market, and the level of operational cash. So, it is recommended to those who use financial information of companies listed in stock exchange, specially institutional stock holders, to pay more attention to the reverse impact of financial leverage on trading volume, Q-tobin ratio, and the cash level.

3. Since the impact of industry-based adjusted trading volume on inventory growth is negative, it seems that stock liquidity with increase in information clearity, makes the managers to reduce storage costs resulting from maintenance of high level of inventory in store, and subsequently it makes them reduce the inventory level in different industries. So, it is recommended to those who use financial information of companies listed in Tehran stock exchange to pay attention not only to the level of industry-based adjusted trading volume, but also to the investment level of companies listed in stock exchange, when evaluating of efficiency of capital market.

Suggestions for future researches

In order to make maximum use of research results and also to contribute to better review of the relationship between liquidity level of stocks and the level of companies` investments in future, it is recommended to pay more attention to below subjects:

1. Reviewing the impact of economic situations such as financial slack and etc. on the relationship between the liquidity level of stocks and the level of companies` investments.

2. Reviewing and Testing the relationship between the liquidity leveloof stocks and the level of companies` investements in loss-making companies comparing to profit-making companies.

3. Considering relatively high fluctuations in economic, cultural and political factors, it is recommended to use non-linear regression design in determination of the relationship between liquidity level of stocks and the level of companies` investments in future studies.

4. Reviewing the impact of other measurement standards of liquidity level of stocks and the level of investments in studying the relationship between liquidity level and the level of companies` investments.

5. Reviewing and testing the relationship between liquidity level of stocks and the level of companies` investments using time pauses and determination of the impact of increasing time pauses in improvement of model anticipation.

Research limitations

1. If other possible variables effective on the level of companies` investments such as company life, growth opportunities and etc. are applied, research results wolud probably change.

2. considering that statistical population is limited to companies listed in Tehran stock exchange which their financial year ends at the end of March, generalization of results to other companies should be done carefully.

3. Extracted data is related to financial statements of 2005-2012, and in this period the used accounting standards have significantly changed. So, exctracted numbers may be heterogeneous.

4. there is no consensus about definition of stock liquidity and the level of companies` investment, so there are different measurment methods based on different point of views. Therefore, using different methods may affect the research results.

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