The Effect of Illiquidity on Capital Gain: Evidence from Iran

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Abstract

Illiquidity is the characteristic of small and emerging markets and analysis of capital gain is very important in these markets due to short horizon of its investors. This paper intends to investigate the effects of illiquidity on capital gain in Iran market. Beside illiquidity factor, market, size, value and momentum factors are also considered. The results show a negative relation between illiquidity and capital gain. Findings indicate that adding illiquidity measure somewhat can cover the market factor effects and four-factor model which includes market, liquidity, size and value factors is the best model to explain the capital gain, while the momentum factor is not found to be priced.

Keywords: Stock Return, Illiquidity, Capital Gain

Introduction

The first step in assessing the performance of an investment is measuring obtained return according to pre-determined targets. Return is a driving force which motives investors and they attempt to achieve maximum returns with minimum risk. Many variables can affect investment returns and therefore, there are different models for predicting returns. The traditional capital asset pricing model developed by Sharpe (1944) and Lintner (1965) associates the expected return of securities with market factor known as beta. But CAPM has many assumptions and cannot adopt with a real stock market and several studies indicate that the cross section of stock return cannot be explained by beta alone as predicted by CAPM (Piccioni, 2011:2). Supplementing CAPM by size and book to market ratio (Fama & French, 1992, 1993) and momentum effect (Jagadeesh & Titman, 1993) representing these state variables provided
improvements over the simple market-factor alone (Hearn, 2010:242 ; Hearn et al.2010:492). Recently liquidity widely has been considered as state variable to explain stock return and many studies have employed it for asset pricing (Chan et al., 2008; Dalgaard, 2009; Hearn, 2010; Chang et al., 2010; Hearn et al., 2010; Narayan and Zheng, 2010; Narayan and Zheng, 2011; Lam and Tam, 2011; Lischewski and Voronkova, 2011; Bley and Saad, 2012; Shieh et al., 2012).

Many papers examine the effect of liquidity on stock return. Most of investors in capital market especially in emerging markets have short term horizon for their investment decisions and it seems that the analysis of capital gain is more important than total return for them, however most of study focus on total return. On the other hand, illiquidity is the main problem of most investors in small and emerging markets and measuring illiquidity and its effect on capital gain is the one of most important concerns of participants in these markets. So this study focuses on capital gain instead of total return and intends to examine the effects of illiquidity on capital gain. Furthermore, the role of size, value and momentum factors are considered in this regard as control variables. Structure of this paper is as follows: Section 2 reviews the literature on the relation between liquidity/illiquidity and stock return. Section 3 describes the data and variables and presents the methodology used in this paper. Section 4 describes the empirical findings and Finally, Section 5 offers a summary of the estimation results and conclusions.

**Literature Review**

Liquidity in financial market is defined as the ease of trading large quantities of securities, quickly, with low cost and without affecting price level. This definition implies multidimensional and elusive phenomenon that is challenging to capture and may affect risks and returns of assets in various ways (Niskanen, 2009: 5; Dalgaard, 2009: 9; Verrier, 2010: 10). Liquidity and marketability influences investors' portfolio decisions and since investors require a higher risk premium for holding illiquid securities, the risk-adjusted returns are lower for liquid stocks (Jun et al., 2003:3). This proposition has been empirically supported in various studies with different liquidity measures.

Study of Amihud and Mendelson(1986) is the pioneer in this regards. It shows bid-ask spread as a liquidity measure positively affect asset returns and risk-adjusted returns are decreasing with respect to liquidity. Brennan and Subrahmanyam (1996) argue that the bid-ask spread is a noisy measure of liquidity because large trades tend to occur outside the spread while small trades tend to occur inside, which means that bid-ask quotes are only good for limited quantities. So Brennan et al. (1998) use trading volume as liquidity measure and investigate the relation between expected returns and liquidity and find a significant negative relation between returns and trading volume for both NYSE and NASDAQ stocks. Datar et al. (1998) use turnover rate as a measure of liquidity and provide evidence for a negative correlation between liquidity and stock returns. Lesmond et al. (1999) model transaction costs based on the frequency of zero-return days and indicate zero return measure is negatively related with firm size and is positively related with spread measures and stock returns.
Amihud (2002) develops the illiquidity ratio which is defined as the ratio of the daily absolute return to daily dollar trading volume and claims it is a good proxy of price-impact dimension of liquidity. He shows that there is a significant relation between liquidity and expected stock returns even in the presence of size, beta and momentum. Pastor and Stambaugh (2003) develop a return-reversal measure as another proxy of price impact which reflects order-flow induced temporary price fluctuations and find that liquidity is a priced state variable. Liu (2006) proposes a new liquidity measure that aims to capture multiple dimensions of liquidity and particularly focus on trading speed. He shows that his innovative measure highly correlate to bid-ask spread, stock turnover and illiquidity ratio of Amihud (2002) and capable to predict stock return for a one year or more. Chan and Faff (2003), Martinez et al. (2005), Chen (2005), Marshal (2006), Eun & Huang (2007), Chan et al. (2008) and Dalgaard (2009) also support this relationship. Currently Chang et al. (2010), Narayan and zheng (2010), Lam and Tam (2011) provide evidence for a negative relation between liquidity and stock returns.

But some of studies provide ambiguous evidence (Hearn et al., 2010; Narayan and zheng, 2011; Lischewski and Voronkova, 2011). Hearn et al. (2010) focus on emerging markets and propos a size and liquidity-augmented capital asset pricing model. They find that the market risk premium and the premiums attributed to size factor and illiquidity are important factors in asset pricing but provide some ambiguous evidence. Their results indicate that the coefficients on the low-illiquidity and medium illiquidity portfolios are negative, as would expect, and firms pay lower returns when the illiquidity variable increases. While, the coefficients on the high-illiquidity portfolios are positive indicating that these companies pay higher returns when the illiquidity measure increases. This behavior is not expected and demonstrates that different valuation techniques should be used to price very high illiquidity stocks and firms. Lischewski and Voronkova (2011) extend the evidence on factors determining stock prices including market, size, value and liquidity factors on emerging markets. They provide evidences supporting existing literature for developed markets regarding to market, size and value factors but Contrary to the expectation, do not find evidence supporting that liquidity is a priced factor on emerging markets.

With reference to above literature, most of studies focus on total return in investigating the relation between liquidity and stock return, while most of investors especially in emerging markets have short term horizon and prefer the capital gain against dividend yield. There for, this paper investigate the relation between liquidity (illiquidity) and capital gain. Also the size, value and momentum are considered in this relation.

**Data & Methodology**

The analysis of this paper is carried out on common stocks of Tehran Stock Exchange at monthly level from March 2002 to November 2011 for 117 months. Tehran stock Exchange is a small market with low transaction stocks. Sample of this study includes stocks with at least 100 trading days. Minimum 100 trading days due to nature of illiquid stocks of Iran's market however for developed markets such as New York and London stock exchanges which have higher stock quantity and diversity, it is 200. Also investment companies are excluded due to
high financial leverage. Finally 72 stocks are selected. The data is extracted from two main sources: Tadbirpardaz database and Tehran Stock Exchange database.

Analysis is done at portfolio level. Stocks randomly are assigned to 7 portfolios as each portfolio includes 10 different stocks. Due to several investor in real market are able to invest in a special stock, selection possibility of a stock in several portfolio is considered. In other word, shares of each portfolio are assigned randomly and one special stock can be in more than one portfolio. In this paper, capital gain is considered as independent variable which is defined as the ratio of difference between stock price at the end and first of a month to price of that stock in first of month. Capital gain of each portfolio is calculated by geometric average of portfolio's stocks. The main dependent variable of this study is illiquidity. Regarding to illiquidity, two commonly use measures are selected: the illiquidity measure of Amihud (2002) and the zero measure of Lesmond et al. (1999).

The illiquidity ratio, proposed by Amihud (2002) is defined as the ratio of the daily absolute return of stock to daily trading volume. Monthly illiquidity ratio is calculated via following equation:

\[
ILLIQ_{i,t} = \frac{1}{D_{i,t}} \sum_{d=1}^{D_{i,t}} \frac{|R_{i,d,t}|}{V_{i,d,t}}
\]

Where \(R_{i,d,t}\) and \(V_{i,d,t}\) are the return and the Trading volume in millions of Rial for stock \(i\) on day \(d\) in month \(t\) and \(D_{i,t}\) is the number of observations for stock \(i\) in month \(t\). Then the portfolio illiquidity measure is the average of individual stocks' illiquidity ratio of each portfolio in each month. This measure captures the price impact as the response of trading volume. If a particular stock has a high value of \(ILLIQ_{i,t}\) indicates that the price moves a lot in response to trading volume and therefore the stock is considered illiquid. Amihud (2002) indicates his illiquidity measure is positively related to stock returns.

The Zero return measure, proposed by Lesmond, Ogden and Trzcinka (1999) is defined as the proportion of zero daily return observed over special period and is obtained from the following equation:

\[
Zero_{i,t} = \frac{Zero\ return_{i,t}}{Tradingday_{i,t}}
\]

Where \(Zero\ return_{i,t}\) is the number of trading days for stock \(i\) in month \(t\) which the return is zero and \(Tradingday_{i,t}\) is the number of trading days for stock \(i\) in month \(t\). Due to calculating the zero return in portfolio level, the average of this measure in individual stocks level is used. The evidences indicate zero return measure captures the transaction cost. Due to close link between zero return and no trades, this measure is a good proxy of the trading cost dimension of liquidity specially for emerging market that data for bid-ask spread is not available for all periods.

Due to investigating the effect of illiquidity on capital gain, the traditional capital asset pricing model is used which is developed by illiquidity factor as following:
Furthermore the effects of size, value and momentum factors are considered. Due to controlling size effects, SMB factor is defined as the difference between average return of small (30% of stocks portfolio with smaller firm size) and big stocks (30% with bigger firm size) for each portfolio in every period. HML as value factor is calculated by the difference between average return of Value (30% with higher B/M) and growth stocks (30% with lower B/M) for each portfolio. Also momentum factor, WML is defined across cumulative abnormal returns (CAR) of stocks for last 3 months and is calculated as difference between average return of winner and loser stocks in each period for every portfolio. Finally the model of this study is defined as following:

\[ r_p - r_f = \alpha + \beta_m (r_m - r_f) + \beta_{iqq} Iiqq_{p,t} \]

Table 1 indicates descriptive statistics of variables and correlation between them for all stocks from March 2002 to November 2011 for 117 months.

**Table 1**

<table>
<thead>
<tr>
<th>statistics</th>
<th>( r )</th>
<th>( r_m )</th>
<th>Amihud</th>
<th>Zero</th>
<th>Size</th>
<th>( B/M )</th>
<th>MOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>0.01465</td>
<td>0.01671</td>
<td>0.0071</td>
<td>0.0854</td>
<td>1389276</td>
<td>0.3406</td>
<td>0.0010</td>
</tr>
<tr>
<td>Median</td>
<td>0.00000</td>
<td>0.0058</td>
<td>0.0086</td>
<td>0.05</td>
<td>357751.6</td>
<td>0.2324</td>
<td>0.0113</td>
</tr>
<tr>
<td>S.D.</td>
<td>0.11907</td>
<td>0.0557</td>
<td>0.1032</td>
<td>0.1250</td>
<td>3194556</td>
<td>0.3124</td>
<td>0.1136</td>
</tr>
<tr>
<td>Min</td>
<td>-0.9998</td>
<td>-0.1049</td>
<td>0.0000</td>
<td>0.0000</td>
<td>5884</td>
<td>0.0065</td>
<td>-0.4707</td>
</tr>
<tr>
<td>Max</td>
<td>4.1648</td>
<td>0.2568</td>
<td>0.7698</td>
<td>1</td>
<td>36348000</td>
<td>2.0647</td>
<td>0.4036</td>
</tr>
</tbody>
</table>

**Correlation**

| \( r \) | 1 |
| \( r_m \) | 0.4460 | 1 |
| Amihud | -0.1074 | -0.0515 | 1 |
| Zero   | -0.0992 | -0.1272 | -0.0500 | 1 |
| Size   | 0.0002  | 0.0103  | 0.0580  | -0.1151 | 1 |
| \( B/M \) | -0.0479 | -0.0504 | 0.0969  | 0.0250  | -0.2002 | 1 |
| MOM    | 0.0852  | 0.1312  | -0.0809 | -0.0281 | 0.0103  | -0.0330 | 1 |

**Notes:** The table reports descriptive statistics of variables and correlation coefficients of variables.

The correlation test shows capital gain is positively relevant to market factor and contrary to expectations is negatively correlated with illiquidity for the both measures of Amihud and Zero return. It also shows that market factor has the higher correlation coefficient than others.
Furthermore size and momentum factors are positively correlated with capital gain while book-to-market ratio is negatively associated with capital gain.

**Empirical results**

At first, Levin-Lin-Chu test showed that all of variables have unit root. Because of heteroscedasticity the GLS has been used instead of OLS to estimate the models. Table 2 reports the estimation results for two different illiquidity measures.

**Table 2**

<table>
<thead>
<tr>
<th></th>
<th>$r_p - r_f = \alpha + \beta_m(r_m - r_f) + \beta_{illiquidity} + \beta_{size}SMB + \beta_{value}HML + \beta_{momentum}WML$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$C$</td>
</tr>
<tr>
<td>-------</td>
<td>-----</td>
</tr>
<tr>
<td><strong>1.</strong></td>
<td>-0.007***</td>
</tr>
<tr>
<td></td>
<td>-6.65</td>
</tr>
<tr>
<td></td>
<td><strong>2.</strong></td>
</tr>
<tr>
<td></td>
<td>-2.29</td>
</tr>
<tr>
<td></td>
<td><strong>3.</strong></td>
</tr>
<tr>
<td></td>
<td>-2.15</td>
</tr>
</tbody>
</table>

Notes: The table reports the estimation results of models. For each model, the first line point out the coefficients with their statistical significance and second line refers to Z statistic.

* Indicates statistical significance of the coefficient and at the 10% level
** Indicates statistical significance of the coefficient and at the 5% level
*** Indicates statistical significance of the coefficient and at the 1% level

At the first step, Amihud illiquidity measure along with size, value and momentum factors are added to CAPM. The results show that illiquidity negatively affects capital gain and it is against the expectations. Because the compensation for the costs and risk associated with illiquidity should be reflected in a higher expected return and rational investors should demand higher capital gain to cover the illiquidity risk. At the second step, the estimation is repeated but with this difference that the illiquidity measure is changed and Zero measure is added to model instead of Amihud measure. The results are repeated again. Finally two illiquidity measures are simultaneously added to the model. The results state that the simultaneously entry of two illiquidity measure to the model increases the impact of illiquidity on capital gain. In other word, increasing illiquidity in market causes the decreasing the capital gain and this result is significantly consistent for both illiquidity measures of Amihud and Zero return separately and simultaneously. Findings imply when investors face with illiquidity, they offer a lower price to
find a buyer for their illiquid shares. So it causes the price of illiquid stocks reduce over the holding period and therefor illiquidity leads to price drop and lower capital gain.

The evidences show that market factor significantly affect capital gain and its effect is stronger than illiquidity factor. Furthermore comparison of models shows that increasing the illiquidity factors to the model, decrease the market factor effects. Findings also indicate size and value factor significantly affect capital gain while momentum effect is significant only at the 10% level and momentum is not a priced factor at the 1% and 5% levels. It means size and value factors are important factors in explanation of capital gain and these factors should be considered along liquidity and market factors in asset pricing.

Concluding remarks and recommendations

The empirical evidence of previous literature suggests that a number of factors may help to explain the pattern of asset returns. But most of them focus on total return while analysis of capital gain for investor of emerging market is more important than total return due to short term investment horizon. This paper investigated the impact of illiquidity on capital gain and considered the role of market, size, value and momentum factors in this relation.

The results indicate illiquidity is one of most important factors in explanation of capital gain and negatively affects it. Yahyazadeifar and khorramdin (2008) provide evidence for the negative correlation between illiquidity measured by Amihud illiquidity ratio and total returns in Iran market. It seems the negative relation of illiquidity and return or capital gain come back to nature of Iran market and its stocks. The findings also show that impact of market factor is stronger than illiquidity and adding more illiquidity measure to the model, reduces the effects of market factor and it means illiquidity somewhat can cover the market factor effects. Results also indicate size and value factors are important priced factors market however momentum effect is not priced. As a result, the four factor model including market, liquidity, size and value is the best model to explain the capital gain in Iran market. According to results of this study, it is recommended to future researchers to investigate the impact of liquidity/illiquidity on capital gain and total return with difference measures and compare the results in emerging and developed markets.

References


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