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MARKET ILLIQUIDITY PREMIUM ON STOCK RETURNS: AN EMPIRICAL STUDY OF TAIWAN STOCK MARKETS

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ABSTRACT

This paper examined the existence of illiquidity premiums in Taiwan stock markets during 1982-2016. First, the illiquidity premium was calculated with the method of Amihud (2014) in a whole period and its three sub periods, and then a five-factor model was formed by adding the new risk premium to the traditional Fama-French-Carhart four-factor model. Then quint portfolios the illiquidity measure by Amihud (2002) in an ascending order and applies factor models to explore the relationship between stock returns and illiquidity premium. The empirical results indicated that the five-factor model increased the relative explanatory power compared to the traditional four-factor model. For the higher illiquidity portfolios, the illiquidity premium demonstrated significantly positive effects on stock returns and the five-factor model showed relatively smaller alphas, which in turn proved the existence of market illiquidity premiums. The empirical results are expected to enhance the understanding of the functioning of illiquidity on developed markets in the literature, and also add more evidence on the emerging market settings.

Contribution/ Originality: This paper contributes to the existing literature of liquidity study, which is mostly done on developed markets, by using the Taiwan stock exchanges, a setting of a typical emerging market. The empirical results are expected to enhance the understanding of the functioning of illiquidity in both developed and emerging markets.

1. INTRODUCTION

Financial theory holds that high return is just the subsidy for high risk. Traditional wisdom focuses more on the systematic risk of market risk, firm size, the price-earnings ratio, and the book-to-market ratio. The importance of liquid risk is commonly neglected. Amihud and Mendelson (1986) pioneered the role of liquidity on asset pricing, and subsequently a growing field of liquidity research exploded on the aspects of liquidity risk, liquidity pricing, and its relevance on financial crisis, as per Amihud *et al.* (2013).

First, Fuenzalida *et al.* (2017) documented that the illiquidity premium was present only in small sized firms and high book-to-market stocks. When controlling for size and distress effects, the difference and significance in risk-adjusted returns between portfolios of high and low illiquidity stocks remained. Jeewon *et al.* (2016) showed that the state of a high illiquidity premium was closely associated with periods of real economic recessions, market declines, and high volatility, which coincided with major events of liquidity dry-up and high liquidity commonality. Also, Hassan and Javed (2011) reported that the high liquidity stocks earned higher returns in comparison to low liquidity stocks. As illiquidity premium exists in equity markets, so decision makers should consider it along with market premium in making decisions regarding investment, financing and valuation of financial instruments. The illiquidity measures can help investors with efficient resource allocation.

The higher the market illiquidity of stock, the greater relevant transaction costs, and therefore the greater the illiquidity risk of stock. Higher than expected returns are needed to compensate for the expected higher future illiquidity. Amihud and Mendelson (1986) systematically investigated the theoretical relationship between asset returns and illiquidity costs. By using the spread data of NYSE and AMEX, they found a significant increasing and concave cross sectional relationship among markets. The evidence was further strengthened in Amihud *et al.* (2010). With the fifty year data, they found that the twelve-month moving averages of monthly risk-adjusted liquidity premium of NYSE and AMEX stock were significantly positive. Adjusted with four factors, the alpha of the illiquidity premium still reached significant increase of 0.5% per month. The detected positive relationship on stock markets also significantly holds among fixed income securities, as found in Amihud and Mendelson (1991)'s study on the Treasury bill and notes markets and Chen *et al.* (2007)'s study on corporate bond markets.

Guo *et al.* (2017) provided strong support for the literature's conjecture that market wide liquidity is an important asset pricing risk factor. Liu *et al.* (2018) also found that the options market liquidity was positively correlated with funding liquidity after controlling for market uncertainty. The positive relationship between funding liquidity and market liquidity in the options market was mainly driven by short-term and deep out-of-the-money options. Jang *et al.* (2015) observed that the illiquidity premium displayed strong state-dependent variations. Their empirical results indicated that a significant unconditional illiquidity premium in the Korean stock market arose due to a substantial illiquidity premium in the expansion–expansive state.

Liquidity externality can exert a systematic market wide effect and dry up the liquidity of the whole market. The overall market liquidity changes are persistent and will affect aggregate asset prices. The phenomenon was modeled by Acharya and Pedersen (2005) in terms of the liquidity market capital asset pricing model (LCAPM). In the LCAPM, the assets display higher required returns when their returns have greater covariance with market wide illiquidity shocks. The empirical prediction was proved by the evidence from Pástor and Stambaugh (2003) and Acharya and Pedersen (2005).

Amihud and Mendelson (2015) explained the rationale behind the exposure to shocks in market liquidity and the exposure to the market illiquidity return premium. The pricing of these risks was stronger in times of greater funding illiquidity and economic stress. Sen (2015) displayed empirical results that clearly indicated the presence of a liquidity premium in the National Stock Exchange of India, as was shown by the positive relationship between illiquidity and returns of the NIFTY Index. Butt and Virk (2015) highlighted the ability of liquidity related model betas in capturing the time variation in the expected returns across illiquid (Nordic) markets than market beta.

Recently, the global financial crisis of 2007-2009 has drawn great attention from both academic and practitioners. Financial markets can suddenly dry up and adversely affect the whole market. Brunnermeier and Pedersen (2009) pointed out that liquidity providers and their access to capital can significantly influence the market liquidity. They provided a theoretical explanation for the factors and the underlying dynamics that caused the market wide liquidity crisis. Their model showed the interaction and multiplier effect of market liquidity and funding liquidity by liquidity spirals. The effects of funding conditions impact liquidity conditions as seen in recent research. Aragon and Strahan (2012) showed that stocks held by Lehamn-connected funds experienced greater declines in market liquidity following their bankruptcy than other stocks. Dick-Nielsen *et al.* (2012) found that when the bond underwriter faced funding problems, the corresponding bond market liquidity showed greater declines thereafter.

Finally, Isaenko and Zhong (2015) found that stock market crises resulted in a significant liquidity premium. The presence of background risk has a negative impact on the liquidity premium. Atilgan *et al.* (2016) conducted portfolio analysis and revealed that stocks that are in the highest illiquidity quintile earned 7.2%–19.2% higher risk-adjusted annual returns than those in the lowest illiquidity quintile. The illiquidity premium was stronger for small stocks and stocks with higher return volatility and it increases or decreases during periods of extremely low or high market returns respectively. Amihud *et al.* (2015) stated that for corporate managers, the positive relationship between expected return and illiquidity means that the more liquid the company's shares, the lower its cost of equity capital was while all other things equal. Thus, managers may be able to lower their cost of capital by taking steps to increase liquidity.

This paper adds to the extant evidence of liquidity studies, which are mostly on developed markets, by using the Taiwan stock exchanges, which is a typical emerging market setting. The empirical investigation aims to examine illiquidity premium in emerging markets. This paper was based on data from the Taiwan stock exchange and Taipei stock exchange, during 1982-2016. The investigations were conducted for four sample periods, including the whole period and three sub-periods. The market illiquidity premium was calculated by using the method proposed by Amihud (2014). The cross-section of the stock market was divided into five illiquidity portfolios according to the illiquidity measure of Amihud (2002). The relative accountability of factor models were then calculated and compared in the illiquidity portfolios with and without market illiquidity premium. The empirical efforts aim to resolve the issue whether market illiquidity matters in asset pricing in emerging markets.

Section two of this paper explains the empirical study procedures and data, section three reports and discusses the empirical results, and the final section has the conclusion and further suggestions.

2. EMPIRICAL PROCEDURES AND DATA

This study used the model proposed by Amihud (2002) to derive liquid measures:

$$ILLIQ_{it} = \frac{1}{D_{it}} \sum_{t=1}^{D_{it}} \frac{|R_{it}|}{DVOL_{it}} \times 10^6 \quad (1)$$

Where the variables used in the formula were defined as follows:

LIQ_{it} : Liquidity indicators of the i^{th} securities on day t.

D_{it} : Monthly trading days.

$|R_{it}|$: Absolute value of daily returns.

$DVOL_{it}$:Daily amount of the transaction (thousand dollars).

The average ratio of the daily absolute return to the daily transaction was here defined as the measure of illiquidity of stocks. The LIQ can closely capture the concept of the response of price to order flow in Kyle (1985) and the measure of market thinness in Silber (1975). Hasbrouck (2002) considered several of the most prominent measures of illiquidity and concluded that the one from Amihud (2002) appears to be the best of alternative proxies.

This paper used the measure by Amihud, 2014 to calculate the liquidity premium of market illiquidity. Amihud (2014) proposed a risk-adjust liquidity premium by controlling the market volatility. As documented in Tinic (1972); Menyah and Paudyal (1996); Chordia *et al.* (2000) volatility and liquidity exhibit significant negative correlation. To separate the volatility, Amihud (2014) first formed the cross-sectional stocks into triple portfolios by the ascending volatility. Then each volatility portfolio was further divided into five portfolios according to their illiquidity. This formed a set of portfolios (3x5) in the study. Finally, after controlling the volatility, the difference of the average return of three most illiquid portfolios and three most liquid portfolios was given a liquidity premium (IML) estimate.

The empirical data were drawn from the Taiwan Economic News (TEJ) from January 1982 to December 2016, for a total of 420 months. The data covered most stocks on the Taiwan stock exchange and Taipei stock exchange, except for excluded market TDR, F shares, and full-cash delivery stocks.

Figure 1 shows the distribution of liquidity premiums (IML) for 1982-2016. It can be seen from Figure 1 that the liquidity premium required by investors is relatively low when the stock market is highly liquidity. From 1985 to 1990, the IML gradually increased mainly due to the bubble in the Taiwan stock market. The internet bubble from, 2000 to 2001 and the Taiwan SARS incident also increased IML.

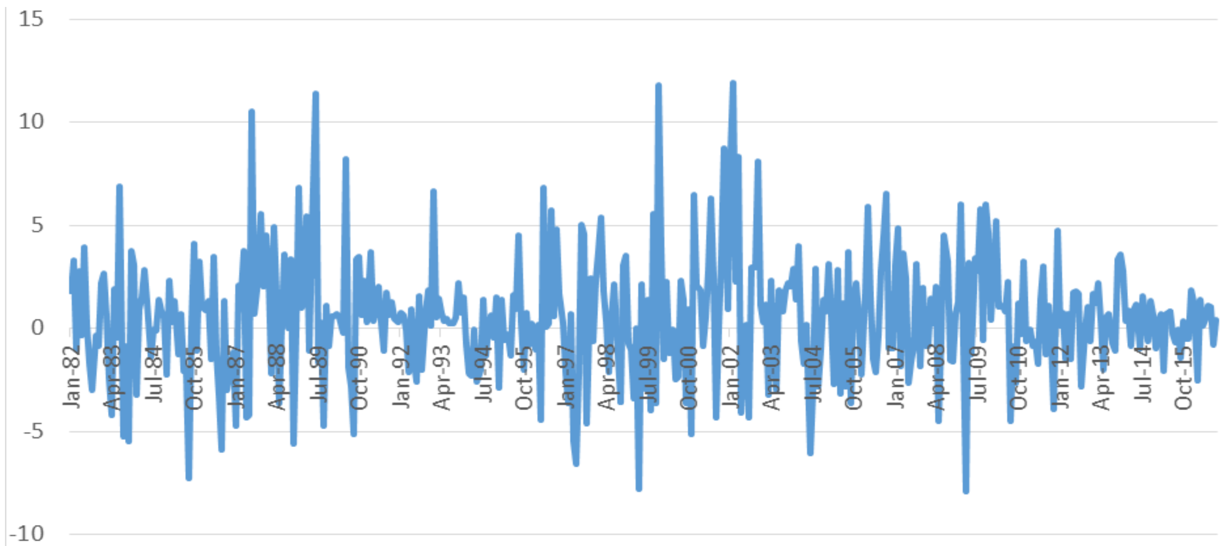

Figure-1. 1982-2016 whole period liquidity premium (IML) data distribution.

Note: Liquidity Premium (IML) is the portfolios of liquidity maximum portfolio and liquidity minimum portfolios of its premium differences.

The main purpose of this study is to ascertain the role of the new illiquidity premium in the asset pricing models ion financial markets. We first examined the relationship between the illiquidity premium and the four traditional market systematic factors in the famous Fama-French-Carhart four factors. The empirical model was specified as follows:

3. THE RELATIONSHIP BETWEEN LIQUID PREMIUM (IML) AND FOUR FACTORS

$$\mathrm{IML}_t = \alpha_t + b_t\mathrm{RMRF}_t + s_t\mathrm{SMB}_t + h_t\mathrm{HML}_t + p_t\mathrm{UMD}_t + e_t \quad (2)$$

Where the variables used in the formula were defined as follows:

IML_t: Illiquid-minus-Liquid premium.

RMRF_t: The market excess return (over the risk free rate).

SMB_t: The return on small-minus-big firms (scale factor).

HML_t: Book-to-market ratio (value factor).

UMD_t: Winner-minus-loser stocks (momentum factor).

Carhart (1997) combined the Fama and French (1993) three factor model with the momentum of Jegadeesh and Titman (1993) to construct a four factor model.

The four-factor model in this study explored whether liquid premiums (IMLs) can be explained by market risk premiums, scale premiums, book-to-market ratio (B/M) premiums, and momentum premiums.

The study compared the four-factor model and the new five-factor model, with the new illiquidity premium defined as a new factor on the illiquidity-sort quintile portfolios. The two empirical models are specified as follows.

4. FOUR FACTOR MODELS

$$r_{it} = \alpha_{it} + b_{it}\text{RMRF}_t + s_{it}\text{SMB}_t + h_{it}\text{HML}_t + p_{it}\text{UMD}_t + e_{it} \tag{3}$$

Where the variables used in the formula were defined as follows:

r_{it} : The risk premium of factor.

$RMRF_t$: The market excess return (over the risk free rate).

SMB_t: The return on small-minus-big firms (scale factor).

HML_t: Book-to-market ratio (value factor).

UMD_t: Winner-minus-loser stocks (momentum factor).

For comparative purposes, this study further examined the ability of the new illiquidity measure by the following five factors model.

5. FIVE FACTOR MODELS

$$r_{it} = \alpha_{it} + b_{it}\text{RMRF}_t + s_{it}\text{SMB}_t + h_{it}\text{HML}_t + p_{it}\text{UMD}_t + m_{it}\text{IML}_t + e_{it} \tag{4}$$

Where the variables used in the formula were defined as follows:

r_{it} : The risk premium of factor.

$RMRF_t$: The market excess return (over the risk free rate).

SMB_t: The return on small-minus-big firms (scale factor).

HML_t: Book-to-market ratio (value factor).

UMD_t: Winner-minus-loser stocks (momentum factor).

IML_t: Illiquid-minus-Liquid premium.

The comparison between the four-factor model and five-factor model was made by the regression r-square and the unexplained part of alphas in the models, which can make certain of the importance of the role of the extra illiquidity premium in asset pricing models. Therefore, as an additional explanatory variable, our results tested whether there was a significant liquid premium (IML) in the Taiwan stock market.

6. EMPIRICAL RESULTS AND ANALYSIS

First, the general sample properties of the key empirical variable, liquidity premium, were reported in Table 1 below for the whole sample and its three subsamples. The average monthly liquidity premiums was about 0.57%, which was relatively comparable with the figure of 0.38% in US markets reported in Amihud (2014). The mean liquidity premiums of three sub-periods were respectively 0.55%, 0.40%, and 0.68%, and the increment of the third sub-period might be due to the subprime crisis of 2007-2009. The percentages of positive premium months were also well beyond the success rate of random fair coin with highly significant in binominal tests. The time series properties of liquidity premium displayed a similar pattern among the four samples. The samples were significantly skewed to the right, leptokurtic of excess kurtosis, and with no significant autocorrelation up to four orders.

Table-1. Liquidity Premium (IML) descriptive statistics.

Data period	1982-2016	1982-1991	1991-2001	2002-2016
Samples	418	120	120	178
Mean	0.571608	0.558608	0.40411	0.6932913
S.D.	2.93178	3.14424	3.058288	2.698342
Skewness	0.445839	0.365716	0.482393	0.5282999
Kurtosis	4.570151	4.244662	4.383864	4.9531348
Ske. p-value	9.91E-05*	0.050969	0.01549*	0.0020042*
Kur. p-value	2.82E-11*	0.002692*	0.000986*	5.21E-08*
AR(1)	0.020127	-0.03033	-0.00678	0.0831425
AR(2)	0.059092	-0.04356	0.113382	0.0486548
AR(3)	-0.00392	-0.01599	-0.09815	-0.006419
AR(4)	0.009347	0.019691	0.051936	-0.076055
5% CI Max	0.098204	0.183088	0.184915	0.151
5% CI Min	-0.0982	-0.18309	-0.18491	-0.151291
PPM*	254/418	74/120	72/120	108/178

Note: 1. * Significant of the two-tailed test at the 5% level.
2. Ske..and Kur. P-value H_0: Normal.
3. PPM stands for percentage of positive month.

Table-2. Four-factor descriptive statistics.

Factor	RMRF	SMB	HML	UMD
Samples	420	420	420	420
Mean	0.006979	-0.41234	0.101949	0.256143
S.D.	9.602217	5.016733	5.656464	5.657473
Skewness	-0.43638	-0.27677	0.353385	-0.36817
Kurtosis	7.799885	7.892233	6.742707	5.19934
Ske. p-value	0.999869	0.98971	0.0015551*	0.998966
Kur. p-value	0	0	0	0
AR(1)	0.072842	0.037659	-0.00248	0.097552
AR(2)	0.056097	-0.07918	-0.0503	-0.06384
AR(3)	-0.03938	0.035837	-0.01339	-0.02898
AR(4)	0.042746	0.087529	-0.09655	-0.02797
5% CI Max	0.098411	0.098337	0.097837	0.098908
5% CI Min	-0.09841	-0.09834	-0.09784	-0.09891
PPM	217/420	194/420	215/420	220/420

Note: 1.RMRF: market factor; SMB: scale Factor; HML: value factor; UMD: momentum factor.
2. * Significant by two-tailed test at the 5% level.
3. Ske .and Kur. P-value H_0: Normal.
4. PPM: The proportion of positive month.

The descriptive statistics of the risk premium used in the four factors model of Fama-French-Carhart are displayed in Table 2. The monthly average premiums of RMRF, SMB, HML, and UMD were 0.007, -0.412, 0.102, and 0.256, respectively. Similar to the IML, the four risk premiums were significantly leptokurtic of excess kurtosis, and had no significant autocorrelation up to four orders, with the exception of no significance of skewness. The PPM of the four risk premiums were far less than IML which were reported in Table 1 for the whole sample period and its three sub-periods.

This study further considered the details of the monthly returns of five LIQ portfolios in Table 3. The mean monthly returns of the five LIQ portfolios in the whole sample periods were monotonically increased with illiquidity measures and were 1.033, 1.288, 1.441, 1.775, and 2.372, respectively. The figures implied that the risk premium between the most liquid and the least liquid portfolio amounted to 16% annually in the Taiwan stock markets, which was noticeable compared to most developed markets. For example, Atilgan *et al.* (2016) showed that stocks that were in the highest illiquidity quintile earned 7.2%–19.2% higher risk-adjusted annual returns than those in the lowest illiquidity quintile. Among the five portfolios, the most liquid portfolio displayed less time series persistence and less skewness when contrasted with the least liquid counterpart portfolio. The results of the descriptive statistics were robust for the three sub-sample period, which were not reported here due to space limits, and are available under request from the authors.

Table-3. Descriptive statistics of monthly returns of LIQ portfolios (1982-2016, 418 months).

Portfolio	I	II	III	IV	V
Mean	1.032567	1.288036	1.441911	1.774581	2.371755
S.D.	10.02245	10.23937	10.61388	10.92575	10.77267
Skewness	0.111921	0.176046	0.538984	0.462393	0.687056
Kurtosis	6.074679	5.45516	6.71791	6.234059	6.750688
Ske. p-value	0.175109	0.070862	3.42E-06*	5.68E-05*	4.89E-09*
Kur. p-value	0	0	0	0	0
AR(1)	0.081269	0.084303	0.095181	0.078238	0.127014
AR(2)	0.02721	0.030685	-0.01604	0.005736	0.045553
AR(3)	-0.03218	-0.0371	-0.02474	0.014948	0.019911
AR(4)	0.005508	0.036145	0.028218	0.052558	0.070711
5% CI Max	0.098539	0.098607	0.09873	0.098423	0.099588
5% CI Min	-0.09854	-0.09861	-0.09873	-0.09842	-0.09959

Note: 1. I is the most liquid portfolio; V is the least liquid portfolio.
2. * Significant of the two-tailed test at the 5% level.
3. Ske .and Kur. P-value, H_0: Normal.

Table-4. Liquidity Premium (IML) and Four-Factor Regression Results.

Data period	1982-2016	1982-1991	1992-2001	2002-2016
Samples	418	120	120	178
alpha	0.681320	0.610670	0.649836	0.679877
t-value	5.577101	2.303546	2.987913	4.620979
RMRF beta	-0.020297	0.020386	-0.017238	-0.193251
t-value	-1.600991	1.032538	-0.678496	-7.274086
SMB beta	0.233993	0.151877	0.306878	0.341779
t-value	9.645258	3.871029	6.634162	7.597774
HML beta	0.123587	0.076643	0.109664	0.300629
t-value	5.494722	2.000847	2.515840	8.578821
UMD beta	-0.090044	-0.062754	-0.097717	-0.144261
t-value	-3.996610	-1.477977	-2.652244	-4.037560
R^2	0.281918	0.157102	0.418330	0.488195

Note: * Significant of the two-tailed test at the 5% level.

The next task of investigation was to test whether the market risk premium, IML, was arguably represented in the traditional Fama-French-Carhart four factors model. Table 4 reports the regression analysis on whether the IML was a significant extra risk premium besides the more traditional risk factors. First, the results showed that the most consistent beta coefficients were size and book-to-market, and both were significantly positive in the four sample periods. The results of significant positive alphas in Table 4 strongly proved that the extra risk premium that cannot be fully carried out by the four factors model. The trend of positive alpha looks like it was strengthened with the evolution of the market throughout the sample periods.

The study further tested the significance of IML with a comparison of the Fama-French-Carhart four factor model and the five factor model with IML added in. Table 5 details the empirical results of the four factor model on the five LIQ portfolios. First, the model fitness in terms of the adjusted R^2 for the five portfolios was fairly good at 0.9 on average, while the least liquid portfolio V had relatively poor fitness of 0.862.

The model fitness shown in our empirical results were rather convincing when compared to the results of Vietnamese markets from Phong and Hoang (2012). Both authors reported that for the single CAPM model, the relative high R^2 coefficients ranged from 68.96% to 80.85% in six portfolios, while the R^2 ranged from 77.39% to 81.38%, with the average of 81.03% in the three-factor model.

While the Boamah (2015) reported that the four-factor model in South Africa markets with the adjusted R^2 ranged from 0.65 to 0.78. For the most liquid portfolio I, although the betas of the four market risk premiums significantly confirmed the theoretical estimated coefficients, the unexplained alpha still significantly amounted to 13% annually. The results of the least liquid portfolio V exhibited a striking contrast.

Table-5. Four-factor model on LIQ portfolios (1982-2016, 418 months).

Portfolio	I	II	II	IV	V
alpha	1.07131	1.470247	1.668982	2.059496	2.695994
t-value	7.919961	11.23873	12.87953	15.14105	13.68305
p-value	2.22E-14*	9.44E-26*	3.81E-32*	1.65E-41*	2.07E-35*
RMRF beta	0.992868	0.973495	0.987816	0.990141	0.893075
t-value	70.7299	71.70737	73.45608	70.1448	43.67722
p-value	6.38E-23*	3.37E-23*	3.31E-23*	1.51E-23*	6.75E-15*
SMB beta	0.201863	0.462074	0.551685	0.693805	0.82836
t-value	7.514835	17.78661	21.43851	25.68545	21.1708
p-value	3.57E-13*	5.88E-53*	4.43E-69*	1.24E-87*	6.74E-68*
HML beta	0.071411	0.202503	0.280903	0.29629	-0.1921
t-value	2.867375	8.407623	11.77389	11.83115	-7.65764
p-value	0.00435*	6.86E-16*	8.61E-28*	5.17E-28*	1.36E-13*
UMD beta	0.041895	-0.13237	-0.19173	-0.1921	-0.1385
t-value	1.679385	-5.48668	-8.02263	-7.65764	-3.81147
p-value	0.093833	7.16E-08*	1.08E-14*	1.36E-13*	0.0001592*
R^2	0.924667	0.932493	0.938354	0.9359	0.861651
F-test	1280.599	1441.026	1587.855	1523.111	650.2776

Note: 1. I is the maximum liquid ; V is the minimum liquid.
2. * Significant of the two-tailed test at the 5% level.

The estimated betas of the Fama-French-Carhart model exhibited irregular influences of HML and UMD. The estimated betas of HML and UMD were -0.19 and -0.14, both at the 1% significant level. The unexplained alphas of the portfolio V even reached 32% annually. Overall, the facts of monotonically increases in alpha and decreases in adjusted R^2 showed that there existed an important risk factor missing in the Fama-French-Carhart factor model. A similar conclusion can be drawn from the three sub-period samples and was not reported here for the sake of space.

The result for the four factor model shows in Table 5 can be seen improved in the IML add-in five factor model. As shown in Table 6, the adjusted R^2 indicated a higher model fitness of the five factor model with 0.94, 0.94, 0.94, 0.94, and 0.89 for the five LIQ portfolios respectively. The estimated betas of IML for the five portfolios exhibited different influence of the liquidity premium on the monthly returns of different illiquidity portfolios.

For the most liquid portfolios I and II, the estimated betas were -0.43 and -0.37 at the significant level, while for the least liquid portfolios IV and V, the associated betas were 0.46 and 0.74 respectively. The unexplained alphas have in general diminished compared to the four factor model, and declined to 1.36, 1.73, 1.66, 1.74, and 2.19 in the five factor model. The three main results drawn from the five factor model, improving model fitness, declining alphas, and differential IML impacts among LIQ portfolios, all showed the existence and significance of the market liquidity risk premium in Taiwan stock markets. The results were robust for the three sub-period samples.

Table-6. Five-factor model on LIQ portfolios (1982-2016, 418 months).

Portfolio	I	II	III	IV	V
alpha	1.362593	1.722916	1.663823	1.742732	2.189254
t-value	10.51809	13.52195	12.36725	13.58114	12.06103
p-value	4.45E-23*	9.77E-35*	4.27E-30*	5.59E-35*	6.77E-29*
RMRF beta	0.984191	0.965968	0.987969	0.999578	0.908171
t-value	75.67934	75.52053	73.15372	77.59782	49.84057
p-value	8.41E-24*	1.89E-24*	3.79E-23*	5.47E-24*	1.46E-17*
SMB beta	0.301901	0.548851	0.549914	0.585016	0.654325
t-value	10.99371	20.32067	19.28274	21.50709	17.00552
p-value	7.93E-25*	4.27E-64*	1.64E-59*	2.47E-69*	1.63E-49*
HML beta	0.124247	0.248336	0.279968	0.238831	0.244069
t-value	5.21458	10.59682	11.31448	10.11947	7.310762
p-value	2.92E-07*	2.30E-23*	4.97E-26*	1.20E-21*	1.39E-12*
UMD beta	0.003399	-0.16577	-0.19105	-0.15023	-0.07153
t-value	0.144742	-7.17762	-7.83456	-6.45918	-2.17407
p-value	0.884985	3.33E-12*	4.04E-14*	2.97E-10*	0.0302683*
IML beta	-0.42753	-0.37085	0.007571	0.464927	0.743762
t-value	-8.49611	-7.49308	0.144885	9.327729	10.54891
p-value	3.62E-16*	4.15E-13*	0.884872	6.72E-19*	3.44E-23*
R^2	0.935742	0.940445	0.938207	0.946948	0.890807
F-test	1215.493	1317.981	1267.277	1489.638	681.3879

Note: 1. I is the maximum liquid; V is the minimum liquid.
2. * Significant of the two-tailed test at the 5% level.

7. CONCLUSION AND REMARKS

This paper empirically examined the existence of illiquidity premiums in Taiwan stock markets during 1982-2016. The average monthly market liquidity premiums was about 0.57%, which was relatively comparable with the figure of 0.38% in the US markets. The empirical results illustrated that mean monthly returns of the five LIQ portfolios in the whole sample periods were monotonically increased with illiquidity measures. The risk premium between the most liquid and the least liquid portfolio amounted to 16% annually in the Taiwan stock markets, which was noticeable compared to most developed markets.

The paper also tested whether the market risk premium, IML, could stand-alone besides the traditional Fama-French-Carhart four factors model. The resulting regression analysis indicated that significant positive alphas existed and that the IML could not be fully carried out by the four factors model. The trend of positive alpha was strengthened with the evolution of the market throughout the sample periods.

The study further tested the significance of IML by a comparison of the Fama-French-Carhart four factor model and the five factor model with IML add-in. Overall, the three main results drawn from the five factor model, namely, improving model fitness, declining alphas, and differential IML impacts among LIQ portfolios, supported the existence and significance of the market liquidity risk premium in Taiwan stock markets.

The empirical evidence of market illiquidity premium further displayed the pattern of time variations throughout the sample period. The inter-temporal market illiquidity premium might guarantee more attention on the exogenous funding liquidity in Taiwan stock markets as suggested by Brunnermeier and Pedersen (2009).

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