Liquidity Commonality Risk and Asset Pricing in Emerging and Developed Stock Markets

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Abstract

Capital markets' focus has recently been on the common determinants of liquidity instead of specific determinants for their well-functioning. This makes liquidity commonality an important area of research for academicians, investors, market players, and policymakers. The current study investigates the liquidity commonality risk within the Fama and French framework in the equities of developed and emerging markets, from June 2005 to July 2015. Multiple measures of liquidity, including the Hui-Heubel liquidity ratio, Amihud ratio, Roll estimator and turnover ratio are employed on the panel data to calculate market liquidity. The panel regression results with fixed effects in the study strongly support the existence of the commonality risk in stock markets. Liquidity commonality risk is weakly priced in Pakistan's equities as compared to equities of China and Japan. In contrast to Japan, the co-movement between market liquidity and stock liquidity is negative in China that shows deviation from liquidity commonality theory. The findings of the study reveal that investors should incorporate the liquidity commonality risk in designing their portfolios.

Keywords: Liquidity commonality, Amihud Ratio, Hui-Heubel liquidity ratio, Roll estimator, Turnover ratio, Innovations in illiquidity

Introduction

Capital markets need liquidity for low transaction costs, better price discovery and less market manipulation. Inadequate liquidity in financial markets affects the trading of securities negatively. Therefore, liquidity is considered an important factor for successful and well-functioning financial markets (Paddrik & Tompaidis, 2019). Traditionally, liquidity has been studied as a single-asset phenomenon, but Chordia *et al.* (2000) concluded liquidity as a market phenomenon. Chordia *et al.* (2000) propose that it is very difficult to study the individual market structure liquidity phenomenon in isolation because it has common determinants. Brockman *et al.* (2009) describe that the industry-wide and market-wide factors determine a firm's liquidity. This phenomenon is named 'liquidity commonality'. Stock illiquidity is influenced by market illiquidity in commonality in liquidity (Foran *et al.*, 2015). The variation in the illiquidity of individual stocks occurs due to illiquidity in the market. The investor bears this liquidity risk due to commonality and gets compensated in the form of a commonality premium. Therefore,

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liquidity commonality is a non-diversifiable risk and strongly influences the strategies of investors in portfolio selection.

A plethora of research has been done to empirically examine the commonality in liquidity in developed markets (Foran *et al.*, 2015; Kim & Lee, 2014; Lee *et al.*, 2014; Vu *et al.*, 2015). Liquidity commonality has been studied in emerging markets as well, but to a very limited extent (Butt & Virk, 2015; Hongxing & Duduchoge, 2017; Tayah *et al.*, 2015). It is debated that developed markets are usually liquid markets as compared to developing markets therefore the chance for the pricing of illiquidity commonality risk is more in developing markets (Bekaert et al., 2007). Moreover, Chollete *et al.* (2007) demonstrate that liquidity is multi-dimensional, and focuses on its breadth, width, resiliency and immediacy aspects. Therefore, it is not justified to study the multidimensional phenomenon of liquidity using a single proxy. The current study attempts to find out the impact of the liquidity commonality risk, proposed by Chordia *et al.* (2000), on the equity returns of stock exchanges using multiple measures of liquidity. To the best of our knowledge, no study has been conducted to examine the liquidity commonality risk using multiple measures of liquidity in developed and emerging markets simultaneously. The study has used the Hui-Heubel liquidity ratio and the Amihud ratio (2002) to determine the price impact and depth traits of liquidity. Transaction costs and resilience aspects of liquidity are tested through the Roll estimator. The turnover ratio is used to analyze the breadth aspect of liquidity. Panel regression with fixed effect is employed in panel data which shows that liquidity commonality beta in China is negative but significant and thus indicating the behavior of developing market towards liquidity commonality is different as compared to developed market.

The current study is helpful for all the market participants in understanding the liquidity dynamics of stock markets. The results of the study also support the investors to include the commonality risk premium while computing stock returns. Moreover, it also helps the regulating authorities to devise strategies to overcome the negative impact of liquidity commonality. This study is beneficial for an international reader because it comparatively analyzes the liquidity commonality in developed and emerging stock markets.

Literature Review

The interaction between liquidity and equity returns was examined for the first time by Amihud and Mendelson (1986), using the high-frequency liquidity measure, the Bid-Ask spread. The study reports that illiquidity has a positive impact on equity returns. In the same line, Brennan and Subrahmanyam (1996) used the Fama and French framework and considered size, price, and book to market ratio to study the interaction

between illiquidity and equity returns. The above studies focused on liquidity as one of the characteristics of the stock.

Another drive in the liquidity literature stems from the paper of Chordia *et al.* (2000), who proposed liquidity as liquidity risk. The sensitivity of individual stocks with shocks of liquidity introduces commonality in liquidity, a new phenomenon in liquidity literature. Investors want compensation in their required return due to the co-movement of stock liquidity with market liquidity. Therefore, the expected return has a positive relationship with the commonality in liquidity. The studies conducted to support the Chordia *et al*. notion are Amihud's (2002) and Pastor and Stambaugh's (2003).

In developed markets, Lee, Tseng, and Yang (2014) have explored the commonality in liquidity in exchange-traded funds of countries in the US market, using the liquidity ratio. However, Kim and Lee (2014) have found a 2.28% annual liquidity commonality premium for investors in the US stock market.

Foran *et al.* (2015) show the impact of liquidity shocks on asset pricing, using the tick data of 12 years in the UK, through principal component analysis. Vu *et al.* (2015) also report that liquidity commonality is the more prominent illiquidity risk in the Australian stock market.

Regarding emerging markets, Tayah *et al.* (2015) have used low-frequency daily liquidity measures, and show that commonality in liquidity is weak across industries in emerging markets. The current study also uses low-frequency liquidity measures because high-frequency data is not maintained in emerging markets.

Butt and Virk (2015) empirically conclude that the liquidity commonality beta is significantly priced in the Finnish stock market, using Amihud (2002). The study also reports that the illiquidity measure of Amihud (2002) is more suitable for measuring illiquidity risk in the Finnish stock market, as compared to others. However, Hongxing and Duduchoge (2017) have found a negative significant liquidity commonality in the Ghana stock market due to asymmetric information. In addition to that, liquidity commonality risk is also prominent in the Indian stock market (Kumar & Misra, 2019). The current study is an extension of the previous ones and attempts to examine whether the liquidity commonality risk, as proposed by Chordia *et al.* (2000), is or is not priced in the developed and emerging stock markets of Japan, Pakistan, and China, during a period of 10 years, from July 2005 to June 2015. The study selects these markets because they are order-driven and an index of 100 companies on the basis of market capitalization is available for each stock market, such as PSX 100, SZSE 100 and TOPIX 100. In addition, the study uses multiple proxies of liquidity, keeping in mind its multiple traits to compute commonality in liquidity risk. Moreover, the study also determines that liquidity commonality risk is sensitive to the liquidity measures used in the study.

Theoretical Framework

Chordia *et al.* (2000) used the word commonality in liquidity for the first time. It introduces a new domain in the liquidity literature and argues that the co-movement in liquidity measures across assets exists and documents the relationship between market liquidity and individual stock liquidity. The commonality in liquidity can be demonstrated from the supply and demand-side explanations.

On the supply side, Brunnermeier and Pedersen (2009) argue that the high volatility in financial markets creates the funding constraints for financial intermediaries. Therefore, financial intermediaries are not able to provide the provision of liquidity across assets. As a consequence, market liquidity will decline, which will lead to an increase in the commonality in liquidity.

In literature, there exist potential demand-side explanations for demonstrating the liquidity commonality. Kamra, Lou, and Sadka (2008) support the Chordia *et al.* (2000) notion and demonstrate that liquidity commonality is generated through the correlated behavior of trading securities by institutional investors. Moreover, investors demand liquidity across assets to invest because investors have no strong incentive to trade securities at the individual level. The covariance arising from market illiquidity and stock illiquidity is commonality in liquidity. Investors want compensation for holding stocks whose liquidity declines due to declining liquidity in the financial markets. As investors are risk-averse and want compensation in the form of liquidity premium, therefore a positive relationship between expected returns and commonality in liquidity exists. The commonality theory leads to generate the following hypothesis.

H_0: The positive co-movement between stock illiquidity and market illiquidity exists in stock markets

H_1: The positive co-movement between stock illiquidity and market illiquidity does not exist in stock markets

Methodology of the Study

Multiple proxies of liquidity have been used in the study to capture the multi-facets of liquidity. The Hui-Heubel liquidity ratio and Amihud ratio (2002) focus on the price impact and depth characteristics of liquidity. Transaction costs and resilience aspects of liquidity are tested through the Roll estimator. The turnover ratio is used to analyze the breadth aspect of liquidity. Moreover, firm size and momentum are taken into consideration to study the liquidity commonality within the Fama and French (1992) framework. The study follows the Dunne *et al.* (2011) and Papavassiliou (2013) sample approach that employs a sub-sample of data set of actively traded, continuously listed stocks, from July 2005 to June 2015, in the indices of the Pakistan Stock Exchange (KSE 100), Shenzhen Stock Exchange (SZSE 100) and Tokyo Stock Exchange (TOPIX 100).

50, 53 and 64 stocks have been selected from the respective indices after the screening of data for further analysis of the current study. The mechanism adopted for the screening of data is similar to Vu *et al.*'s (2015) and Foran *et al.*'s (2015). The procedure for data screening is given below.

- Stocks must have 100 positive trading volume days to be included in the sample.
- The stocks which have a negative market capitalization and book to market ratio should be excluded from the sample.
- For the calculation of the monthly illiquidity measure, 15 valid observations are essential during the month.
- The values of the stock during the delisting year should be excluded.

Operational Definition of Variables

Hui-Heubel Liquidity Ratio (HHLR): The HHLR is a proxy used to measure the price impact, breadth and resilience aspects of liquidity. The trading volume and their price impacts are related in this ratio. This ratio is computed for a 5-day period to smooth the volatility. The high value of HHLR shows high illiquidity in the market. The low value of HHLR indicates a high breadth in the market.

$$\text{HHLR} = \frac{\text{Pmax-Pmin/Pmin}}{\text{Turnover ratio}}$$

Amihud Measure (2000): The Amihud illiquidity ratio is a price impact liquidity proxy and measures the cost associated with large trade. A high value of the Amihud ratio describes that less volume of shares trades in the market and that the market is illiquid.

$$AM = | ER_{it} | / PV_{it}$$

ER_{it} is the daily equity return at time t, and P and V are the daily prices and trading volume of the share during the period July 2005 to June 2015.

Roll Estimator: The study has adopted the modified version of the Roll estimator, developed by Goyenko *et al.* (2009). The increase in the variance of the change in prices leads to an increase in transaction costs. The high value of the Roll estimator indicates a high transaction cost that will lead to the market being less liquid.

$$Roll = \begin{cases} 2\sqrt{-Cov(\Delta Pt, \Delta Pt-1)} & \text{When } Cov(\Delta P_t, \Delta P_{t-1}) < 0 \\ 0 & \text{When } Cov(\Delta P_t, \Delta P_{t-1}) \geq 0 \end{cases}$$

Turnover Ratio: The turnover ratio is used as a proxy to measure the market depth and breadth dimensions of liquidity, in a similar manner proposed by Datar, Naik,

and Radcliffe (1998). A low turnover ratio indicates illiquidity. It is a volume-based measure and captures the breadth dimension of market liquidity.

$$\mathbf{TR= \sum P.Q/ S.P}$$

PQ=price and trading volume of stock

S.P=number of outstanding stocks and average price

Firm Size: The firm size represents the market price of all the shares of non-financial firms, outstanding during the month in the financial market of Pakistan. It is measured in the study as:

$$\mathbf{Firm\ size = ln\ (MC)_{it}}$$

Where $(MC)_{it}$ is the market capitalization of security i during the monthly time frame t.

Momentum: Momentum is the tool used to measure the trend in prices of equities. It is measured as a cumulative return of the past twelve months' return with a one-month lag.

$$\mathbf{Momentum = \sum R_{t12} - R_{t-1}}$$

Stock Returns: The monthly stock returns of the non-financial firms, continuously listed in indices of the stock market during 2005-2015 are calculated using the formula:

$$\mathbf{SR_{(it)} = In\ (P_{(it)} / P_{(it-1)})}$$

$SR_{(it)}$= Return of stock i of non-financial firms listed in the Pakistan Stock Exchange during month t.

$P_{(it)}$ = Closing price of security i during monthly period t.

$P_{(it-1)}$ = Closing price of security i at the end of month t-1.

Autoregressive Process (AR2) for Innovation in Illiquidity: In financial markets, the persistence of liquidity is a common problem due to auto-correlation. This can make the result biased. In order to solve the problem of auto-correlation, the residuals of each illiquidity ratio at the stock level are generated through the auto-regressive (AR 2) process.

$$C_t^i = \alpha_0 + \alpha_1 C_{t-1}^i + \alpha_2 C_{t-2}^i + \ldots\ldots\ldots + \alpha_x C_{t-x}^i + \lambda_4 \mu_t^i$$

Market Liquidity: The market liquidity is the sum of residuals of each illiquidity ratio, generated through the AR 2 process. All the selected stocks fulfilling the selection criteria in the index are used for computing the market liquidity.

$$\mathbf{Market\ liquidity} = c_t^M - E_{t-1}(c_t^M)$$

Liquidity Commonality Beta $\boldsymbol{\beta_i^1}$***:*** It is the covariance arising from market illiquidity and stock illiquidity. $\boldsymbol{\beta_i^1}$ is the commonality beta. Chordia *et al.* (2001) reveal the positive relationship between the expected return and commonality beta because investors want compensation for holding stocks whose liquidity declines due to declining

liquidity in the financial markets. As investors are risk-averse, they want compensation in the form of a liquidity premium due to the variations in illiquidity. The commonality beta is written as:

$$\boldsymbol{\beta_i^1} = \frac{cov\left(c_t^i - E_{t-1}\left(c_t^i\right), c_t^M - E_{t-1}(c_t^M)\ \right)}{var(r_t^M - E_{t-1}(r_t^M) - [c_t^M - E_{t-1}(c_t^M)])}$$

Formation of Decile Portfolios

This study uses the methodology of Kim and Lee (2014) and Vu *et al.* (2015). The Decile portfolios are prepared for each liquidity measure. Now each portfolio now has stocks of similar liquidity levels.

The liquidity commonality beta is calculated for each portfolio using 36 monthly observations. These estimated portfolio loadings are assigned to individual stocks. The study follows the methodology of Lee (2011), Kim and Lee (2014) and Vu *et al.* (2015), and stocks as test assets have been used at the regression stage.

The econometric equation to measure the liquidity commonality risk within the Fama and French framework is given below:

$$E\ (r_t^i - r_t^f\ ) = \ \alpha_t + +\lambda_1\beta_t^{1i} + \varphi_2 SIZE_t + \varphi_3 MOM_t \ldots\ldots(1)$$

r_t^i = Expected return of security i during monthly time period t

r_t^f = Monthly t-bill rate as risk-free rate of security during time period of month t

β_t^{1i} = Commonality liquidity risk of security i during a month t

$SIZE_t$ = firm size of security i during a month t

MOM_t = momentum of security i at monthly time t.

Panel Regression

Panel regression with fixed effect has been applied after the Housman test to examine the commonality liquidity specification derived in Equation 1. Panel regression, suggested by Petersen (2009), has been employed instead of the Fama Macbeth (1973) in the study to avoid statistical biases.

Results and Discussion

Table 1 shows the statistical summary of the illiquidity measures and equity returns of the stock markets of Pakistan, Japan, and China. The maximum return on equity in Pakistan's stock exchange is 38%, relative to 4.6% and 5.3% of Tokyo's and China's respectively. The volatility in Pakistan's stock market is more as compared to other financial markets. The value of the Hui-Heubel liquidity ratio is greater in Pakistan, which indicates that short-term volatility is highest in Pakistan's stock exchange as compared to Japan's and China's stock exchange. The maximum value of the Roll estimator in Japan is 37.7, as compared to Pakistan and China, indicating that high transaction costs exist in Japan. In Pakistan, the Amihud ratio is 1.47, the highest as

compared to Japan and China and this shows more chances of price impacts existing in Pakistan's stock exchange. The lower standard deviation of the illiquidity measures from the mean demonstrates less risk in loss of liquidity because fluctuations in liquidity from the mean of these illiquidity measures are low. Positive skewness is noted for all illiquidity measures, indicating that the distribution is rightly skewed. Excess kurtosis has been observed in the data set of illiquidity.

Table 1: *Statistical Summary*

Country Variables	Mean	Median	Max	Min	SD	Skewness	Kurtosis
Pakistan							
Amihud Measure (AM)	1.476	.113	97.699	.000	9.615	9.423	93.368
Hui-Heubel Liquidity Ratio (HHLR)	15.971	8.573	20.659	.001	21.686	4.429	27.978
Roll Estimator (RE)	.988	.820	3.359	.000	.646	1.574	5.684
Turnover Ratio (TR)	.004	.003	.015	.003	.003	1.490	4.512
Stock Returns (Ri)	.002	.006	.385	-.448	.102	-.509	6.933
Japan							
Amihud Measure (AM)	.454	.170	7.55	.001	.917	4.817	32.946
Hui-Heubel Liquidity Ratio (HHLR)	.504	.342	3.998	.057	.514	3.727	22.018
Turnover Ratio (TR)	.028	.024	.276	.001	.029	5.373	44.971
Roll Estimator (RE)	6.571	3.651	37.713	1.016	21.515	10.463	112.886
Stock Returns (Ri)	.007	.001	.046	-.109	.017	-2.169	16.384
China							
Amihud Measure (AM)	.341	0.112	7.398	.013	0.948	6.261	44.391
Hui-Heubel Liquidity Ratio (HHLR)	.360	.082	4.358	.029	0.765	3.173	13.271
Turnover Ratio (TR)	.061	.038	.725	.012	.082	5.046	36.880
Roll Estimator (RE)	.206	.172	1.171	0.013	0.147	3.058	17.813
Stock Returns (Ri)	.001	.003	.053	-.076	.018	-.761	5.992

Correlation among the illiquidity measures is presented in Table 2. The correlation among the illiquidity measures is within tolerable limits. Therefore, there is no problem of multi-co-linearity.

Table 2: *Correlation Matrix*

Country Variables	Amihud Measure (AM)	Hui-Heubel Liquidity Ratio (HHLR)	Roll Estimator (RE)	Turnover Ratio (TR)
Pakistan				
Amihud Measure (AM)	1	-0.021	.265	-.107
Hui-Heubel Liquidity Ratio (HHLR)	-.021	1	.219	-.183
Roll Estimator (RE)	.265	.219	1	-.156
Turnover Ratio (TR)	-.107	-.183	-.156	1
Japan				
Amihud Measure (AM)	1	.378	.051	-.045
Hui-Heubel Liquidity Ratio (HHLR)	.378	1	.146	.141
Turnover Ratio (TR)	.051	.146	1	-.047
Roll Estimator (RE)	-.045	.141	-.047	1
China				
Amihud Measure (AM)	1	.539	-.048	.327
Hui-Heubel Liquidity Ratio (HHLR)	.539	1	-0.06	.071
Turnover Ratio (TR)	-.048	-0.06	1	.110
Roll Estimator (RE)	.327	.071	.110	1

Innovations in Illiquidity Measures

The weighted average of residuals of each liquidity measure is taken to compute innovations in the market liquidity for Pakistan, Japan, and China. The graphs show the trend of liquidity cost due to each liquidity measure during 2005-2015.

Pakistan

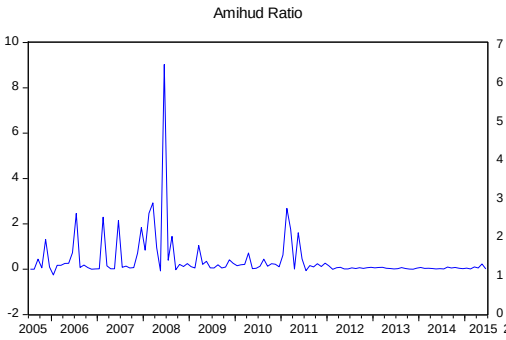

Fig. 1: *Innovations in Amihud Ratio*

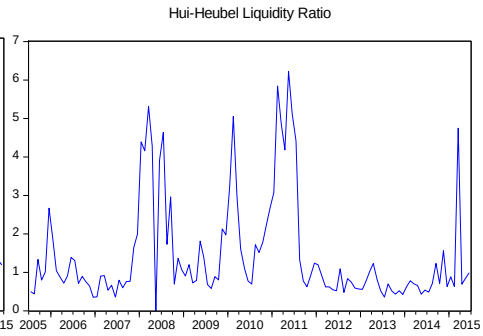

Fig. 2: *Innovations in Hui-Heubel Liquidity Ratio*

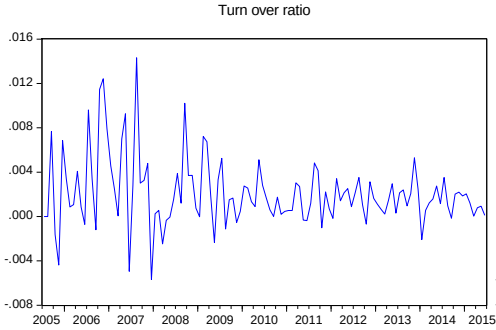

Fig. 3: *Innovations in Turnover Ratio*

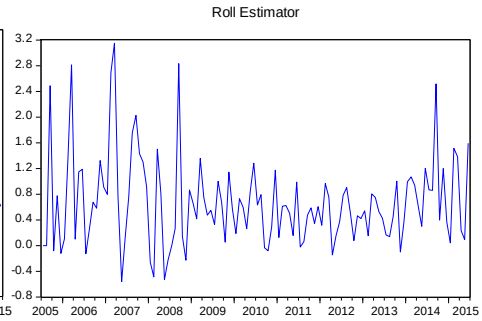

Fig. 4: *Innovations in Roll Estimator*

Japan

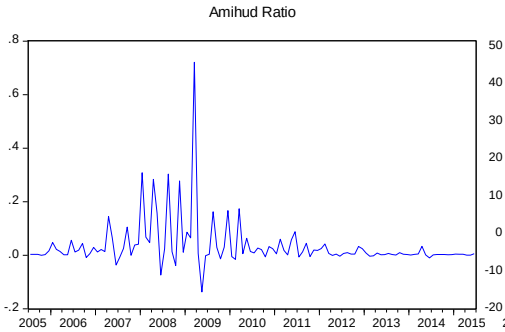

Fig. 5: *Innovations in Amihud Ratio*

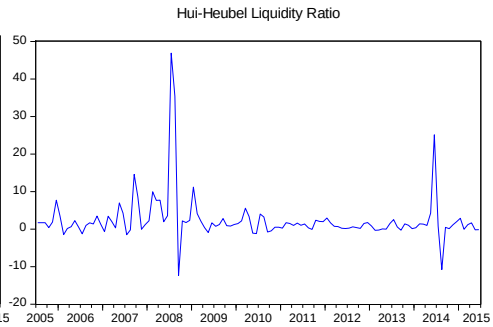

Fig. 6: *Innovations in Hui-Heubel liquidity Ratio*

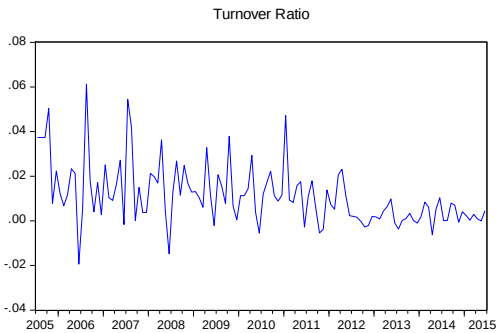

Fig. 7: *Innovations in Turnover Ratio*

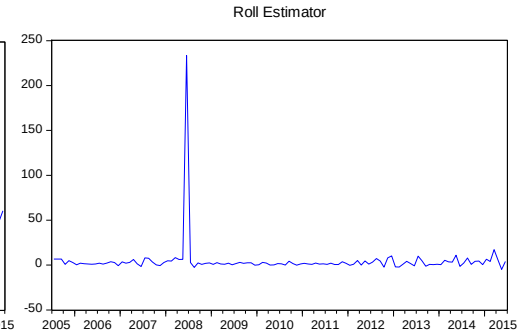

Fig. 8: *Innovations in Roll Estimator*

China

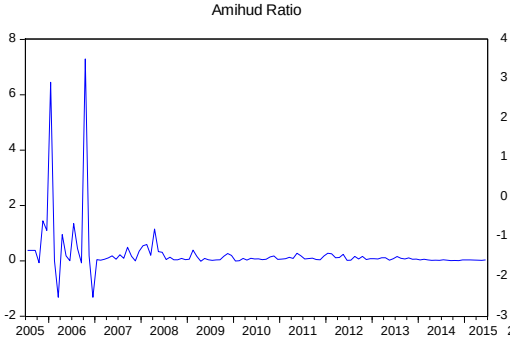

Fig. 9: *Innovations in Amihud Ratio*

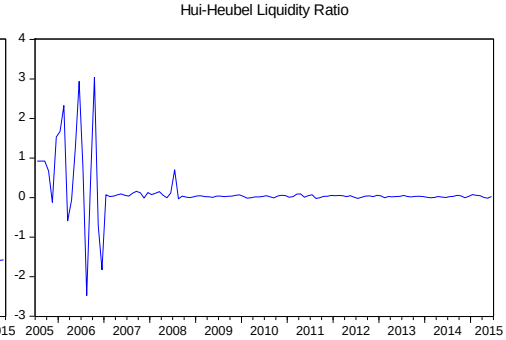

Fig. 10: *Innovations in Hui-Heubel liquidity Ratio*

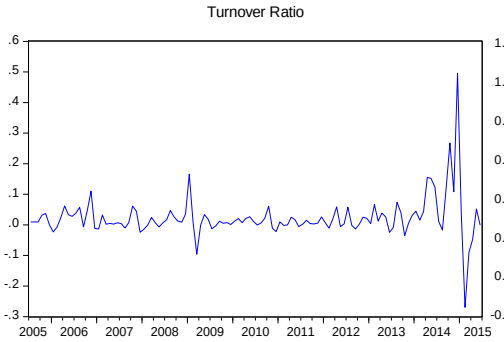

Fig. 11: *Innovations in Turnover Ratio*

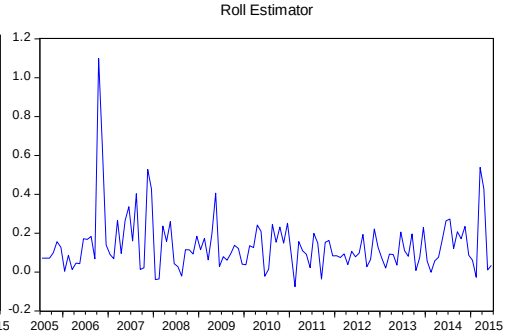

Fig. 12: *Innovations in Roll Estimator*

Market Liquidity

Market liquidity is derived by computing the equally-weighted sum of the illiquidity ratios of all the stocks included in the indices of the Pakistan Stock Exchange, Tokyo Stock Exchange, and Shenzhen Stock Exchange, from July 2005 to June 2015. In 2008, an obvious hump existed in the Pakistan Stock Exchange due to the floor rule during the financial crisis (Sharif, 2015). As a result, the Pakistan stock market was shut down and was excluded from the emerging market index. In 2007, upper spikes in market

illiquidity were due to the global crisis. Figure 17 also shows the condition of market illiquidity, which improves in later periods. Now, Pakistan[3] has been declared a successful hidden frontier market, having a raise in the growth rate of 16% during the last 12 months.

Figure 14 shows the spike in illiquidity between 2008 and 2009, in response to the worst intraday crash of 10% in the existence of the Tokyo Stock Exchange. Kawai and Takagi (2009) report that Japan was among those countries that were badly affected by the 2008-2009 economic crisis. It was one of the advanced economies that experienced negative growth in 2008 and 2009. A slight hump is observed in 2014 due to the Fukushima disaster.

During 2005-2007, illiquidity spikes have been observed after the Asian financial crisis in China. The Asian equity markets, including China, were badly affected in the context of liquidity due to the global liquidity crunch, which started around 2007. A big hump has been observed around 2015 due to the devaluation of Yuan that caused the rapid selling of stocks in the Shenzhen Stock Exchange and dropped its index by 8.5%.

Pakistan

Fig. 13: *Market Liquidity in Pakistan*

Japan

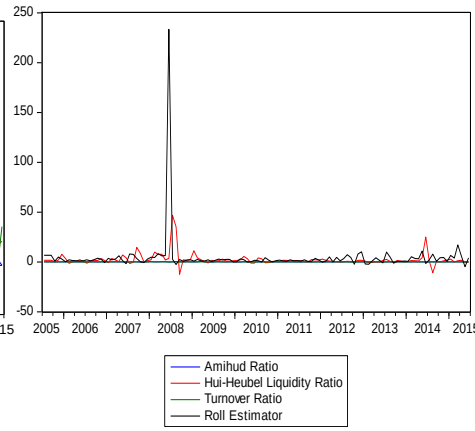

Fig. 14: *Market Liquidity in Japan*

[3] Bloomberg date June 30, 2015. Link http://www.bloomberg.com/news/articles/2015-06-30/in-best-hidden-frontier-market-boom-signals-pakistan-revival.

China

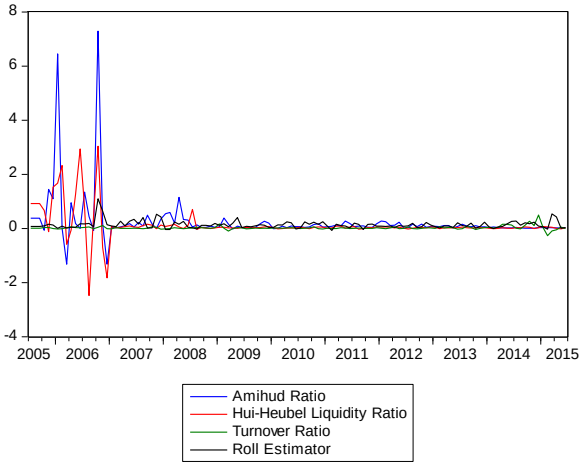

Fig.15: *Market Liquidity in China*

The average betas for all the portfolios, sorted on the basis of illiquidity, are calculated and their results are reported in Table 3. A mixed trend has been observed in the betas of the illiquidity measures in Pakistan, Japan, and China. Vu *et al.* (2015) and Lee (2011) observed the same trend in Australia and the USA.

Table 3: *Portfolio Betas of Pakistan, Japan and China*

Country liquidity Indicators	Panel A (Amihud Ratio)	Panel B (Hui-Heubel liquidity ratio)	Panel C (Turnover ratio)	Panel D (Roll Estimator)
Pakistan				
Portfolio	β_1	β_1	β_1	β_1
(Lowest) 1	.016	-1.714	.003	-.027
2	.001	-3.529	.002	.715
3	.085	-0.455	.001	.707
4	.222	-4.380	.001	.595
5	.023	-1.133	.003	.525
6	.001	-0.382	.002	.069
7	.061	-0.346	.003	.549
8	.025	-6.688	.001	.734
9	.226	-0.043	.004	.276
(Highest)10	.230	-0.209	005	.858
Japan				
(Lowest) 1	.127	.006	-.040	.442
2	.008	.001	-.101	.429
3	.007	.392	.043	.491
4	.009	-.002	-.022	.360
5	-.006	.190	-.028	.073
6	.008	.009	.021	.120
7	.018	.001	.089	.204
8	.160	.021	.044	.735
9	1.079	.098	.005	.496
(Highest)10	1.114	.317	.009	.216
China				
(Lowest) 1	.553	.431	.120	.266
2	.159	.487	.265	.223
3	.369	.414	.047	.275
4	.564	.442	.068	.319
5	.410	.484	.029	.309
6	.594	.442	.090	.452
7	.625	.473	.091	.278
8	.723	.752	.128	.533
9	.898	.625	.162	.627
(Highest)10	.836	.731	.740	.796

Hausman Test for Liquidity Indicators

The significance of p-value suggests that Panel regression with fixed effect is appropriate for examining the impact of illiquidity commonality risk on asset pricing.

Table 4: Hausman Test for Liquidity Indicators

Correlated Random Effects - Hausman Test Test cross-section random effects				
Country	Test Variable	Chi-Sq.Statistics	Chi Sq.d.f	Prob
Pakistan	Amihud Ratio	.050	3	.000
	Hui-Heubel Liquidity Ratio	.042	3	.000
	Turnover Ratio	.038	3	.000
	Roll Estimator	.036	3	.000
Japan	Amihud Ratio	1.980	3	.000
	Hui-Heubel Liquidity Ratio	2.010	3	.000
	Turnover Ratio	1.561	3	.000
	Roll Estimator	1.861	3	.000
China	Amihud Ratio	.091	3	.000
	Hui-Heubel Liquidity Ratio	.061	3	.000
	Turnover Ratio	.059	3	.000
	Roll Estimator	.036	3	.000

Panel Regression Results of Liquidity Indicators in Pakistan, Japan and China

Table 5 reports the regression results of all illiquidity measures in the Pakistani, Japanese, and Chinese stock markets. The commonality beta is significant and positive in the Japan stock exchange with respect to the illiquidity measure of the Roll estimator and the Amihud measure, at the 1% significance level. The significant coefficient of the commonality beta, with respect to the turnover ratio, also indicates the presence of the commonality premium in Pakistan's financial markets. The results of the study demonstrate that investors are compensated when they take liquidity commonality risk in these markets. Moreover, liquidity commonality risk is sensitive to liquidity proxies used in the study. In contrast to Pakistan and Japan, the study observes negative significant coefficients of the commonality beta for all illiquidity measures in China's stock market, which is in contradiction to Chordia *et al.* (2000). Hongxing and Duduchoge (2017) report a significant negative commonality beta (β_1) in Ghana's stock market and explain that the emerging market is usually characterized by asymmetrical information and noise that leads to a drop in the value of assets dramatically; during illiquidity shocks in the market, and affect the stock returns badly. The number of significant coefficients of the commonality beta is more in China as compared to Japan and Pakistan, demonstrating that the commonality liquidity impact is more pronounced in China as compared to stock markets in Pakistan and Japan. The firm size and momentum effects are also significant

in all stock markets, just like in developed markets, as proved by Vu *et al.* (2015), Kim and Lee (2014) and Hongxing and Duduchoge (2017). The theoretical assertion of Chordia *et al.* (2000) regarding liquidity commonality implements in the stock markets of Pakistan and Japan.

Table 5: *Panel Regression effects of Illiquidity Measures in Pakistan, Japan and China*

Country variables	Panel A (Amihud Ratio)	Panel B (Hui-Heubel liquidity ratio)	Panel C (Turnover ratio)	Panel D (Roll Estimator)
Pakistan				
Constant	-.912***	-.527	-0.240	-1.032
	(-3.940)	(-2.120)	(-11.690)	(-4.830)
β_1	-.076	.000	.038**	-.012
	(-.090)	(-.190)	(2.070)	(-.700)
Firm Size	.0380***	.0230***	.007***	.046***
	(-4.110)	(-2.240)	(-11.110)	(-5.40)
Momentum	-.036***	-.049***	-.047***	-.019*
	(-3.180)	(-4.320)	(-4.670)	(-1.800)
F-statistics	4.100	6.890	15.500	-9.800
Japan				
Constant	.231***	.367***	-.111***	.159***
	(-4.090)	(-10.830)	(-2.520)	(-4.030)
β_1	.031***	-.003	-.045	.098***
	(7.500)	-0.800	(-.750)	(2.940)
Firm Size	-.009***	-.014***	.007	-.009***
	(-4.150)	(-10.990)	(-.810)	(-4.920)
Momentum	-.039***	-.108***	.057***	-.055***
	(-3.050)	(-7.930)	(-5.280)	(-4.120)
F-statistics	10.100	12.220	6.490	6.370
China				
Constant	-.182***	-.716***	-.236***	-.349***
	(-2.750)	(-8.200)	(-3.480)	(-5.240)
β_1	-.024***	.030***	-.023***	-.064***
	(-2.860)	(-4.710)	(-3.730)	(-3.650)
Firm Size	.008***	.029***	.011***	.017***
	(-2.810)	(-8.220)	(-3.770)	(-5.910)
Momentum	-.060***	-.095***	-.102***	-.080***
	(-5.430)	(-7.790)	(-7.780)	(-6.600)
F-statistics	18.75	7.48	8.77	5.44

*T-statistics are given in parenthesis *indicate 10% level of significance, ** indicate 5% level of significance and *** indicate 1% level of significance*

Conclusion

The findings of the current study conclude that the commonality liquidity risk has been priced in the emerging and developed stock markets during July 2005-June 2015.

The results of the study are also sensitive to the liquidity measures used in the study. In Pakistan, the liquidity commonality beta is positive and significant only for the turnover ratio. In Japan, significant coefficients of the commonality beta have been observed with respect to the Amihud ratio and the Roll estimator, demonstrating that the transaction cost liquidity and price impact liquidity affect the stock returns in developed markets. The results of the study are in line with the theoretical notion proposed by Chordia *et al.* (2000) for liquidity commonality. Moreover, it also supports the studies of Vu *et al.* (2015) and Foren *et al.* (2015), who found that the commonality liquidity beta is priced in the Australian Stock Exchange and the London Stock Exchange. Butt and Virk (2015) also found the pricing of the commonality liquidity risk in the Finnish stock market, with respect to the Amihud measure.

In China, contrasting results regarding the liquidity commonality theory, proposed by Chordia *et al.* (2000), have been observed. The negative significant coefficients of the commonality beta, with respect to all liquidity measures in the Shenzhen Stock Exchange, pave a new direction for future research. The possible reason for the negative commonality liquidity risk is that a positive association does not exist between liquidity commonality and return commonality at the same time. Different sources cause return commonality and liquidity commonality. The co-movement in the order type brings liquidity commonality, whereas the co-movement in the order flow creates return commonality (Domowitz & Wang, 2002). Future studies can be conducted to check the negative impact of commonality in liquidity, in equity returns. Moreover, commonality liquidity composite can be designed in the future by using principal component analysis.

The findings of the study support that commonality in liquidity risk is priced in the stock markets. Therefore, investors should consider the commonality risk in designing their portfolios. Moreover, market players and policymakers should consider the liquidity commonality risk for the provision of liquidity in the long- and short-run for the well-functioning of stock markets.

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