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Liquidity Risks and Asset Pricing in Asian Stock Markets

by

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This thesis is dedicated to my beloved parents; To whom I owe my whole life. To my brother; Usman Saeed. To my sister Nadia Saeed

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This is to certify that the research work presented in the thesis, entitled "**Liquidity Risks and Asset Pricing in Asian Stock Markets**" was conducted under the supervision of **Dr. Arshad Hassan**. No part of this thesis has been submitted anywhere else for any other degree. This thesis is submitted to the **Department of Management Sciences, Capital University of Science and Technology** in partial fulfillment of the requirements for the degree of Doctor in Philosophy in the field of **Management Sciences.** The open defence of the thesis was conducted on **January 17, 2020.**

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List of Publications

It is certified that following publication(s) have been made out of the research work that has been carried out for this thesis:-

1. **Saeed, S.**, & Hassan, A. (2018). Inter-linkages between Liquidity and Stock Returns: An Empirical investigation through Panel Cointegration. *Pakistan Journal of Commerce and Social Sciences (PJCSS)*, 12(2), 617-637.

2. **Saeed, S.**,& Hassan, A. Flight to Liquidity Risk, Multiple Liquidity Measures and Equity Returns: Evidence from Pakistan Stock Exchange. *Journal of Managerial Sciences (JMS)*, 11(4), 371-387.

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Abstract

The main purpose of doing the study is to examine the pricing of liquidity risks in Asian stock markets. The current study is a deductive study that empirically tests the un- conditional version of liquidity adjusted capital asset pricing model developed by Acharya and Pedersen (2005). Multiple measures of liquidity including Amihud ratio, Amivest liquidity, Hui-Heubel liquidity ratio, Market efficiency coefficient, zero return, turnover and Roll estimator have been used for measuring multidimensional liquidity. The current study investigates the influence of different types of liquidity risks including commonality in liquidity, Flight to liquidity and depressed wealth effect on equity returns of Asian stock markets including Japan, Pakistan, India, China and Thailand during 2005-2015. For the estimation of liquidity risks fixed effect panel regression has been employed in the study. Moreover liquidity adjusted Capital asset pricing model is based upon the developed market. The study attempts to investigate that this model can be or cannot be implied in its original form in emerging markets of Asia. The study also identifies the gray area in the model that needs to be addressed for its better implication in Asian emerging markets. The findings of the study support that individual and aggregate liquidity risks are priced in Asian stock markets and investors are compensated for the wealth shocks and decline in stock and market liquidity. The flight to liquidity risks is least prominent in Asian stock market among the individual liquidity risks. The results of the study are also sensitive to liquidity measures selected for the study.

Keywords: Emerging markets, Liquidity adjusted capital asset pricing model, Commonality in liquidity, Flight to liquidity, Depressed effect of wealth, Panel regression with fixed effects.

JEL Classification: C12, C23, G11, G12, G15

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Abbreviations

AL	Amivest Liquidity
AM	Amihud Measure
APT	Arbitrage Pricing Theory
CAPM	Capital Asset Pricing Model
CL	Commonality in Liquidity
DE	Depressed Effect of Wealth
FL	Flight to Liquidity
HHLR	Hui-Heubel Liquidity Ratio
LCAPM	Liquidity Adjusted Capital Asset Pricing Model
LL	Liquidity Level
MEC	Market Efficiency Coefficient
NIFTY 100	National Stock Exchange
PSX 100	Pakistan Stock Exchange
RE	Roll Estimator
SET 100	Stock Exchange of Thailand
SZSE 100	Shenzhen Stock Exchange
TOPIX 100	Tokyo Stock Exchange
TR	Turnover Ratio
ZR	Zero Return

Chapter 1

Introduction

This chapter illustrates the theoretical background of the study. It also narrates the problem area for the research along with research gap. Moreover the research objectives, research questions along with significance and limitation are mentioned in the first chapter of research.

1.1 Theoretical Background

According to market microstructure the two important functions for asset pricing are market liquidity and price discovery (Wenjaun 2017). In a financial market buyers and sellers meet for trading securities. Financial intermediaries including brokers and dealers arrange the trade or buyers and sellers interact directly for trading assets without intermediaries. According to Madhavan (2000) and Hasbrouck (2007) explicit and implicit rules exist for governing trading mechanism and defining the structure of market. This market structure prescribes the behavior of investors including when, what, how and where trade is done. This what, when where and how is the origin of price formation and market liquidity. Capital markets need liquidity for low transaction cost, better price discovery and less market manipulation. Inadequate liquidity in financial markets affects the trading of securities badly. Therefore liquidity is considered an important determinant in asset pricing (Paddrik and Tompaidis 2019). Traditionally Asset pricing models

usually neglects an important reality that prices originate in markets and market liquidity and price discovery both have major contribution towards it. These factors can be excluded if models for asset pricing are able to explain the pragmatic actions of asset prices, but this does not always happen. Anomalies, momentum, and the changing cast of factors are essential for explaining the behavior of asset prices to some extent (Quiros et al., 2017). This shows that market microstructure implications are essential to be incorporated in to asset pricing models (Wenjaun, 2017). The current study focuses on market liquidity; one of the implications of market microstructure theory on asset pricing.

In 1930 Keynes has stated stock liquidity as; a stock is liquid if it is realizable quickly in the market without any loss in its price. A financial market is liquid when bulk of transactions occur without much impact on the price of long term debt and equity instruments i.e. debt and stocks. In other words market liquidity is one of the characteristics of the market showing its ability to trade large no of stocks without taking time and with minimum price spread. According to O'Hara (2004), Sarr & Lybek (2002) Liu (2006) and Good hart (2008) market liquidity is a broad term incorporating various aspects like depth, breadth, resiliency and time.

1.1.1 Market Depth

Caruana & Kodres (2008) is referred as trading in an individual security. It shows the relationship between price movements and large trade volume. The stock has a deep market if it has the ability of being traded in bulk without creating any impact on its price. Market depth is also termed as liquidity inside the security.

1.1.2 Market Breadth/Width

It is related to the direction of the market. The overall direction of the market is gauged by analyzing the fraction of companies advancing to the fraction of companies declining. Advancing companies are those companies whose prices are moving upward where as declining companies show a downward trend in prices.

If number of advancing companies in the market is more than reducing companies the market will has positive market breadth or width. Positive market breadth is a signal of bullish market segment. Negative market breadth comprising more number of declining companies than advancing companies confirms bearish trend in the market. Breadth also indicates market tightness. In a liquid market spreads are thin and avoid more movement in prices (Sarr & Lybek, 2002).

1.1.3 Market Resilience

It refers to time period a market takes to reach equilibrium position by reverting the prices of securities to their mean values in the state of momentous changes in prices. Price fluctuations occur due to release of usually negative news or trading of large volumes in market(Berves, 2008).

1.1.4 Time

It refers to the speed of absorbing the trade by the market. The execution of trade in a minimum time is the speed of trading in the market(Sekoni ,2015).

Market depth, breadth, resilience and time are considered as the dimensions of liquidity. Market depth measures transaction cost. The cost an investor has to pay to trade a security. Another source for less trading in a stock market is asymmetric information, an important component of market micro structure. Asymmetric information force uninformed investors to do less trading. Due to less trading small number of stocks are traded in stock market and frequency of trade are also low. This affects two dimensions depth and market resilience of liquidity. Market resilience is also affected when more time of investor is consumed for trading due to search frictions.

Liquidity is considered as liquidity risk when there is difficulty in trading the asset. Liquidity risk exists when an investor wants to trade an asset but no one in the market wants to trade for that asset. Every investor desires compensation in his or her required rate of return when he or she is exposed to liquidity risk. Investors

incorporate the liquidity risk in required rate of return indicating illiquidity cost affect asset pricing. Liquidity is one of the significant determinants of expected equity return (Leirvik et al., 2017; Corwin & Schultz, 2012 and Amer et al., 2017).

Chordia et al. (2000) has introduced another phenomena in liquidity risk is commonality in liquidity. According to liquidity commonality stock illiquidity is influenced by market illiquidity. The variation in the illiquidity of individual stock occurs due to illiquidity in the market. Investor bears this risk and gets compensation in the form of commonality premium. Therefore liquidity commonality is non diversifiable risk. It is very hard to pin down the existence of common liquidity component that influence the liquidity of individual stock. The factors that affect the demand or supply of liquidity inside the group of stocks originate Commonality in liquidity. Coughenour and Saad (2004) have demonstrated that co movement in stock and market liquidity is due to common factors involved in providing liquidity. The study identified Specialist firm as a common factor for stocks listed in NYSE. Investors of both sides of trading that is buyers and sellers may offer liquidity through limit orders or take liquidity through market orders. Therefore trend of both trade and market for limit order decisions is involved in driving commonality in liquidity. Hameed Kang and Viswanathan (2010) have reported that market states are also involved in affecting the funding capacities of financial intermediaries and create co movement in both liquidities.

Another phase came in liquidity literature and Pastor and Stambaugh (2003) introduced flight to liquidity risk. Flight to liquidity becomes an illiquid risk when investors replace illiquid assets with liquid assets. Investors usually pay a premium for those stocks that remain liquid in illiquid market situation. As a result negative association exists between flight to liquidity risk and expected equity returns. Acharya and Pedersen (2005) identified another illiquidity risk depressed wealth effect; investors face wealth problems when they want to liquidate illiquid assets but they cannot do so. Hence depressed wealth effect of illiquidity negatively affects the excess return of securities.

Finance literature shows various models to measure risk and assess the worth of risky assets. At first capital asset pricing model (CAPM) by (Sharp, 1964) has

been developed for asset pricing. This model has focused only one risk factor for explaining expected return of asset. Extensions have been occurred in CAPM for the better explanation of expected returns in stock markets. Fama and French (1993) have identified three risk factors firm size, market factor and book to market ratio for asset pricing. Merton (1973) proposed Intertemporal capital asset pricing model (ICAPM) for the valuation of equity through changes in wealth and consumption opportunities. Roll and Ross (1984) have investigated that there is a relationship between price and systematic factors. These systematic factors are multiple risk factors that are involved in measuring the return of assets.Arbitrage pricing theory (APT) tried to fill the gap for identifying the risk by incorporating various macroeconomic factors. CAPM and APT assume that market is frictionless and transaction cost plays no role in trading of securities. These models measure the worth of assets on the basis of present value of their future cash flows. If future cash flows of one security are similar to another security the price of these securities in the market should be same. In reality the securities having same cash flows have different prices. A large number of factors contribute for this price differential including illiquidity of stock. Investor's expectation regarding potential of future trading of securities matters a lot in their investment strategies. They consider expectation of counterparty regarding that security while determining their required rate of return. Investors' preferences about future potential of trading of securities make liquidity an important factor in asset pricing. This study attempts to incorporate liquidity risk in asset pricing models. Liquidity Asset pricing models has an advantage edge over standard asset pricing models. The main difference between the two models is that former include illiquidity cost while the latter do not include it. Previous models for asset pricing have ignored market illiquidity and price discovery mechanism and their effects on asset pricing.

1.2 Problem Area for Research

Traditional models of asset pricing have ignored the features of market micro structure such as price discovery mechanism and liquidity. Standard models for

asset pricing assume investors are price takers. Liquidity models for asset pricing relax this assumption because it might not be held in all circumstances. If the price level of security is being affected by the trading activity it should be included in valuation of equities. Large buy order by an investor brings upward trend in prices; this fact should also be integrated in to asset pricing. Therefore liquidity should be involved in assessing the fair worth of securities.

Liquidity is to trade the securities in large volume with minimal impact on cost, price and time(Goodhart, 2008) . This shows that liquidity has multi-dimensional traits including breadth, depth, tightness, resiliency and immediacy. It is not possible to study the concept of liquidity using a single measure. There is a need to study the multidimensional aspects of liquidity. Therefore current study takes diverse measures of liquidity to study its multiple traits.

Acharya and Pedersen (2005) developed a unified framework of liquidity; liquidity adjusted capital asset pricing model(LCAPM) that has incorporated different channels of liquidity risk including illiquidity level, liquidity commonality, and flight to liquidity and depressed wealth on excess equity returns. This model is based upon developed market and has been empirically tested in U.S stock market by Acharya and Pedersen (2005) and Kim and Lee (2014). Vu et al. (2015) empirically tests this model in Australian stock markets, one of the developed stock exchanges. Investors are usually interested to make investment in emerging markets for higher returns and they want to know various risks for measuring their expected returns. Therefore there is a need to analyze the pricing of individual liquidity risks (liquidity commonality, flight to liquidity and depressed wealth effect of liquidity) and total liquidity risk and systematic risks on assets in emerging and developed stock markets.

Third problem identified for the research is LCAPM theory Acharya and Pedersen (2005) is a developed market theory and it is based upon features of developed market The characteristics of developed market are entirely different from emerging market. There is a need to examine that LCAPM theory in its original form can be applied in emerging markets of Asia or not.

The overall problem statement of the study is

The role of liquidity risks in explaining returns is inconsistent with reference to direction in developing and emerging markets that requires further insight.

The problem of the study is investigated through employing Liquidity adjusted capital asset pricing model in Asian stock markets (developed and emerging ones) to empirically examine the pricing of individual liquidity risks (liquidity commonality, flight to liquidity and depressed wealth effect) and total liquidity and systematic risk on asset pricing using multiple measures of liquidity (as it is a multidimensional concept) to know LCAPM theory (a developed market theory) can be applied in emerging market of Asia in its original form or not.

The study empirically tests liquidity adjusted capital asset pricing model in order-driven Asian stock markets including Japan, Pakistan, India, China and Thailand. Japan is a developed market where as rest of the countries is emerging markets. This study has included the developed as well as emerging Asian market for the first time to empirically test the liquidity adjusted capital asset pricing model proposed by Acharya and Pedersen (2005) during a period of 10 years starting from July 2005 and ends at June 2015.Moreover the study attempts to investigate that theoretical assertions, proposed by Chordia et al. (2000), Pastor and Stambaugh (2003) and Acharya and Pedersen (2005) in Liquidity adjusted capital asset pricing model, can be employed in their original form in developed and emerging Asian stock markets.

1.3 Research Gap and its Rationale

Empirical literature of finance contains very few studies conducted in the context of liquidity risk examined through liquidity adjusted CAPM. Some researchers have tested level of illiquidity; one of the elements of liquidity adjusted capital asset pricing model in developed and emerging market such as (Lesmond, 2005; Eleswarapu & Venkataraman, 2006; Lam & Tam ,2011; Nguyen & Lo, 2012; Bali et al. 2013; Jun and Ying, 2014). Traditional Liquidity model focuses on the impact of level of illiquidity on stock returns. Recent studies focused on systematic aspects of liquidity including commonality in liquidity (Korajczyk & Sadka 2008;

Lee, Tseng & Yang 2014; Mayordomo Moreno & Pena, 2014; Foran, Hutchinson and Sullivan, 2015). Flight to liquidity risk and depressed wealth effect of liquidity risks are not studied deeply.

The current study attempts to fill this gap and in depth analyze level of liquidity (illiquidity cost) and all the channels of liquidity risks including liquidity commonality, flight to liquidity and depressed wealth effect individually and total liquidity risks and systematic risk at aggregate level on asset pricing.

According to Bekaert et al. (2007) liquidity risks and its associated channels of liquidity risks are studied in U.S, although this market is one of the most liquid world markets. The testing of illiquidity risks in this liquid market is not appropriate and questioning one. Butt and Virk (2015) in their study argue that emerging markets are relatively illiquid as compared to developed one. Therefore it is appropriate to test the illiquidity risk model in emerging markets. The current study fills this gap and tests LCAPM model simultaneously on emerging and developed markets in order to know illiquidity risk exist in developed markets or developed markets are liquid markets. The study includes Pakistan (KSE), India (NSE) Japan (TSE), China (SSE) and Thailand (SET) stock markets. Japan is a developed market and the rest of the stock markets are emerging markets. The reason for empirically testing LCAPM model on emerging and developed markets of Asia is to know liquidity risks at individual level or aggregate level are priced in developed and emerging markets or not.

Saar & Lybek (2002) and Liu (2006) reveal that liquidity is a multidimensional concept. It has five dimensions: depth, breadth, tightness, timing and Resiliency. According to Liu (2006) multi-dimensional liquidity is stated as the security either debt or equity has ability to trade in bulk at low cost and without an upward movement in its price. Liquidity has multiple features breadth, depth, resiliency, transaction cost and timing. Different measures for illiquidity have been used in the study to capture various dimensions of liquidity because there is no single measure that unequivocally measures all aspects of liquidity including tightness, immediacy, depth, breadth and resiliency. Therefore current study also fills the

gap while incorporating multiple measures for analyzing illiquidity risks and its associated channels in emerging markets as well just like developed markets.

The current study according to my knowledge is a first comprehensive study that empirically tests the Acharya and Pedersen (2005) model in Asian stock market using multiple measures of liquidity for measuring illiquidity risk and its associated channels during a period of ten years from July2005 to June2015.

It contributes the literature in many ways; firstly the multidimensional liquidity has been investigated as characteristic and liquidity risks in Asian stock markets for the first time. Secondly LCAPM theory is a theory developed by Acharya and Pedersen (2005) for developed market of U.S and most of the research carried out in this context targeted the developed markets. Few studies focused emerging markets even illiquidity risk is more pronounced in emerging markets rather than developed one. This study attempts not only to empirically test the developed market theory of illiquidity proposed by Acharya and Pedersen (2005) on Asian stock markets but also investigates that the theory can be implemented in its original form in Asian emerging stock exchanges or needs some modification to be implemented in emerging stock markets.

In the nut shell the current study empirically tests the liquidity adjusted capital asset pricing model in developed and emerging stock markets of Asia. It uses multiple measures of liquidity to capture its various aspects such as market depth, market breadth, resiliency and time. In addition to that it also explores that LCAPM is applied in its original form in emerging markets of Asia or not.

1.4 Research Questions

The questions asked in the current study are; 1) Do different channels of liquidity risks including commonality in liquidity, flight to liquidity and depressed wealth effect price in Asian stock markets? 2) Are aggregate liquidity risks and systematic risks priced in financial markets of Asia? 3) Is illiquidity level of stock affect excess return in Asian stock markets? 4) Does LCAPM model apply in Asian markets

in its original form? 5) Does the relationship between liquidity risk and equity returns being affected by different illiquidity measures?

1.5 Objectives of the Study

The objectives of the study are illustrated below.

- To examine the effects of level of illiquidity on stock returns in Asian stock markets.
- To investigate liquidity risk in the form of the co-movement between individual stock liquidity and market liquidity (liquidity commonality) will be priced in Asian stock markets
- To provide insight about the liquidity risk in the form of the co-movement between stock returns and market liquidity(flight to liquidity) will be priced in Asian stock markets.
- To investigate liquidity risk in the form of the co-movement between stock liquidity and market returns (depressed wealth effect) will be priced in Asian stock markets.
- To analyze the pricing of aggregate systematic and liquidity risks in Asian equities.
- To explore the influence of different illiquidity measures on the relationship between illiquidity risk and equity returns.
- To analyze LCAPM model in its original form will be applied in Asian stock markets

1.6 Significance of the Study

The multipurpose comparative study is conducted to empirically test the Liquidity adjusted Capital asset pricing model on markets of Asia by employing 7

liquidity measures. It enables the investors, risk managers to incorporate liquidity risk while designing investment and hedging strategies to improve their risk profile and investment returns respectively.Emerging markets are characterized by asymmetric information, lack of transparent information and noise trading that creates negative impact of illiquidity risks on asset pricing. This study is helpful for regulatory authorities to design a code of regulation for controlling systematic liquidity shocks that tend to improve liquidity position and size of stock markets. This study contributes a lot for enhancing liquidity literature in finance in many respects. It will explore the relationship between different forms of liquidity risks and expected returns in Asian stock markets. It will compare the results of LCAPM in developed (Japan) and emerging (Pakistan, India, China and Thailand) Asian markets in the context of systematic liquidity risks for the first time. Asia attracts domestic as well as global investors for investment. This study is helpful for investors to understand the liquidity conditions of Asian stock markets that will lead to increase domestic as well as foreign investment participation. This study empirically demonstrates liquidity as the barometer of the stock market for investment decisions for investors and market participants and most importantly for economic policy makers.

The study is helpful for different groups of investors. As institutional investor focus is to compute cost per volume because they usually execute the large transactions. The measures used in the study such as Amihud Ratio (2002), Amivest liquidity and Hui-Heubel liquidity ratio shows the response of price while trading in large volume. These measures capture depth and resiliency aspects of liquidity. The risks associated with changes in price response affects the returns of stocks in these markets. These measures enable the institutional investor for the selection of illiquid and liquid stocks in portfolios for diversification.

The study is also beneficial for individual investors who have a concern about the cost of a single trade. Roll estimator has been used in the study that reflects market tightness. The sever competition between bid and ask price makes the market tight. In tight market individual investors are reluctant to invest in securities instead they sell the investments for monetary rewards. Therefore flight to liquidity

risks is more prominent in tight markets that enable the individual investor in designing their selling strategies for designing their portfolios. The study helps the investors to include liquidity commonality premium in their expected returns.

Researcher have used various models for asset pricing including CAPM, APT and ICAPM. The deficiency of these models is that they determine the pricing of assets without transaction cost. The novelty of the study is to empirically analyze the Liquidity adjusted capital asset pricing in the context of transaction cost. Another novelty of the study is that multiple measures of liquidity are used to capture different traits of liquidity. Amihud measure, Amivest liquidity, zero return, market efficiency coefficient Hui-Heubel liquidity ratio, turnover and Roll estimator have been used for measuring depth breadth resiliency and tightness aspects of market liquidity. Study also contributes by suggesting some modification in LCAPM theory for its better implication in emerging markets.

The study is the first comprehensive study based on most recent data (July 2005-June 2015) to empirically estimate and analyze the liquidity risk behavior of stock returns by employing LCAPM in Asian Stock markets using multiple measures of liquidity.

1.7 Limitations of the Study

- The study includes only non-financial listed firms of Asian Stock markets. The study could include financial as well as nonfinancial firms.
- The study includes those liquidity measures which can be applied for developed as well as emerging Asian markets. The high frequency liquidity proxies use for measuring liquidity risk in developed markets are excluded from the study.
- The research is limited to empirically examine the un- conditional version of Liquidity adjusted capital asset pricing model. The conditional version of Liquidity Adjusted Capital asset pricing model is not examined in the study.

1.8 Plan of the study

The study is comprised of five chapters. The theoretical and empirical literature of the study is presented in the second chapter. Third chapter discuss the data and methodology of the study. Results and findings of the study are reported in the fourth chapter. In the last chapter conclusion of the study is given along with recommendation and future direction.

Chapter 2

Literature Review

Liquidity and asset pricing is the area under discussion in finance research literature. The pricing of liquidity that is liquidity premium is the subject of huge interest for accountants, actuaries, financial intermediaries and regulators because these parties are usually involved in measuring fair prices of securities.

Researchers identified that liquidity has two forms. Trading liquidity and funding liquidity. Trading liquidity is the liquidity of asset. It is the ease of trading the securities in the market. Funding liquidity is quick and easy access of traders and firms towards rising funds. The present study focuses on trading liquidity.

2.1 Theoretical Review of Liquidity and Asset Pricing

According to De Nikolo and Ivaschenko (2009) liquidity is one of the hidden variables and Von Wyss (2004) demonstrate liquidity as a multi-facet concept. Holden et al. (2012) define liquidity as; a stock, bond or asset is liquid if it is quickly convertible in to cash on selling at a competitive price in a short time. Pastor and Stambaugh (2003) presents the elaborated concept of liquidity; the security either debt or equity has an ability to quickly trade in bulk at low cost and without an upward movement in its price.

The financial market is liquid when large number of buyers and sellers are available and trading of securities in large quantities can be executed quickly with low price impact. Therefore a capital market having low spread, large number of bids and ask prices and maximum stability is a liquid capital market. According to Saar and Lybek (2002) market liquidity is usually measured through five dimensions depth, breadth, timing, tightness and resiliency. A single measure cannot incorporate all the aspects of liquidity. Thus an attempt to find out a universal standard liquidity measure that inculcates all the characteristics continues to be an area of research.

Crockett (2008) demonstrates market depth as the ability of the market to absorb the trade of a security without creating any influence on its price. It means orders below and above the trading price of the security is available.

Market tightness is the cost involved in turning around a certain amount of shares within a short interval of time. Ivanchuck (2004) elaborates market resiliency as the capability of the market to bring the prices of the securities to their intrinsic value to correct the order imbalances created in result of liquidity shock. Von Wyss (2004) specifies timing as the execution of trade of security at a required time at the existing market price.

2.2 Market Microstructure Theory and Liquidity

Market microstructure deals with the mechanism of trading in the market and its implication on process of price formation. Market microstructure is inbuilt on three dimensions of market liquidity as predicted by Kyle (1985). These three dimensions are Tightness, depth and resilience. Kerry (2008) model show that the dimensions of liquidity are related to price and to quantity purchased and sold.

2.2.1 Market Liquidity Model Kerry (2008)

Market liquidity model (2008) is given below in Figure 2.1.

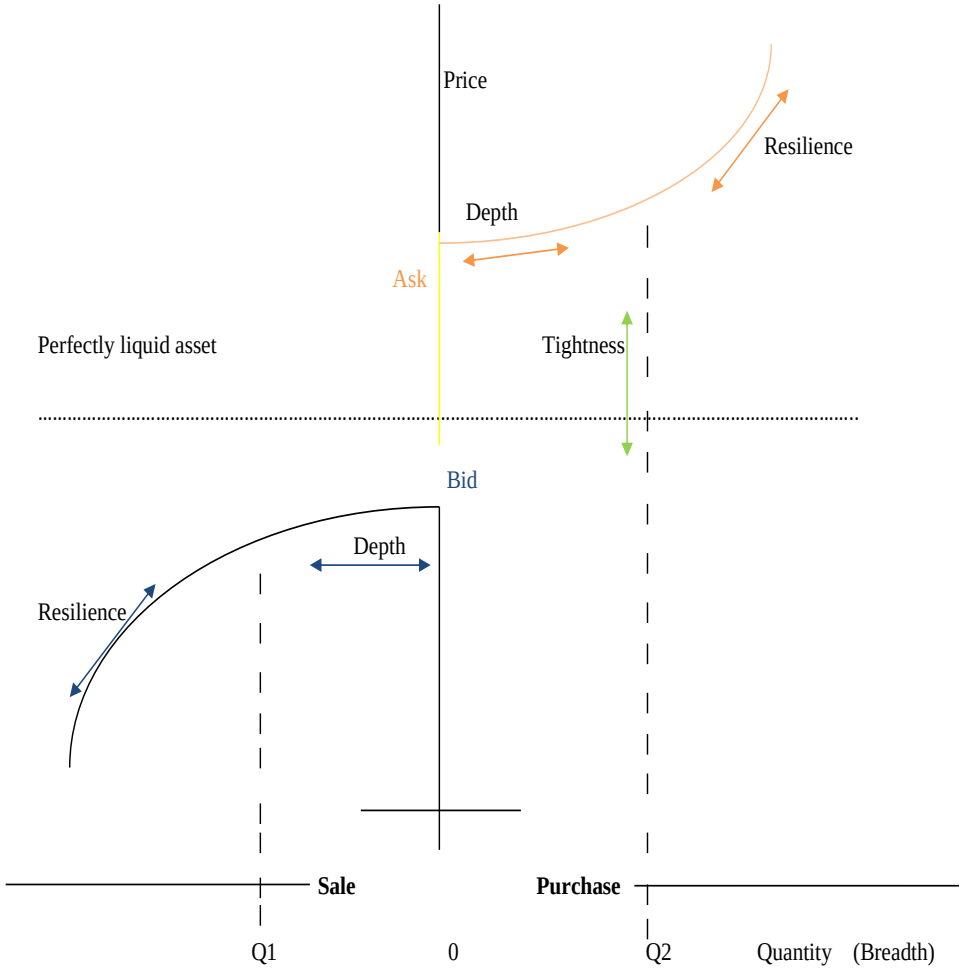

FIGURE 2.1: Dimensions of Market Liquidity (An Adaption of Kerry 2008).

According to this model the relationship among market liquidity, price and quantity are represented in the form of supply and demand curve. Tightness is the size of bid -ask- spread. The volume of trade having no impact of price represents depth. Resilience measures the speed which eliminates the price impact of trade. In order to acquire the assets on right hand side, per unit prices by volume have to be paid. Investor receives per unit prices by volume if he sells the asset on left hand side.

In graph demand side is represented as red curve. If the buyer wants to enter the transaction, he must pay a price even for doing the transaction in minimum amount, that price is shown as bid on the red line. The bid price is usually above the intrinsic price of perfect liquid security. Supply side is shown as blue curve in the graph. Seller must accept that price for completing the transaction and that

price is usually less, shown as ask price on blue line, than the price of perfectly liquid asset. The discount accept by the seller represents illiquidity cost for him. Bid ask spread is the difference between bid and ask price and it is represented as green line in the graph.

The extension of demand curve from 0 to Q2 indicates that initially the marginal impact of increase in order flow is zero and represents market depth of the security. The market will be deep if the length of the initial section of the demand curve is longer. The marginal impact of an increase in order flow will be going to increase after the threshold transacted quantity Q2 of the security. The extension after Q2 in demand curve represents the speed of continuous increase in marginal impact of each additional order flow that defines the resiliency. However the increase in number of buy orders in the market is accompanied by increase in price.

On the other hand 0 to Q1 represents no change in marginal price in supply curve but beyond Q1 when number of sell order increases in the market, the price is going to decrease incrementally. In efficient markets transaction price would be same for all perfectly liquid securities. It is shown as dotted line in graph and represents same valuation of assets due to same cash flows. In reality market imperfections cause difference in cash flows of assets that lead to their different valuations. Vayanos and Wang (2011), in line with Hasbrouck (2007) work in market microstructure and Amihud et al. (2005) in pricing of assets, identify main sources of illiquidity that cause market imperfections.

2.3 Market Micro Structure and Illiquidity Sources

Amihud et al(1986, 2005) demonstrated that frictional costs reduce the prices and magnifying the returns to compensate the investors for bearing illiquidity cost and liquidity premium may be priced in securities. Liquidity premium is created in securities return due to elementary features of market micro structure and asset

conditions. In theory four main sources of liquidity risk are transaction costs, asymmetric information, search frictions and inventory risk.

2.3.1 Transaction Costs

The cost incurred for trading any security. It has a great impact on price of assets. Practically market is not frictionless and prices of securities are affected by these market frictions. Therefore investor include these frictions in their expected returns. Amihud and Mendelson (1986) demonstrated the causal relationship between asset pricing and transaction costs, and show higher the bid-ask spreads of securities higher will be their return (Amihud et al., 2005).

The trading of assets is costly when variation in transation cost occurs due to time. Moreover liquidity shocks and uncertainty in holding period force the investors to liquidate their positions. Transaction cost is depreciated over the holding period which makes its effect on asset prices unpredictable. Moreover, Investors don't know about the transaction cost they bear in future at the time of sale. This unique feature of uncertainty and fluctuation in transaction cost makes it a systematic or unavoidable risk for trading securities.

In market Clintele effect also exist. Clintele effect is difference in transaction cost due to different holding periods of investors. Short term and long term investors' strategies for investment are different. Long term investors usually hold more non liquid assets as compared to short term investors. Investors usually avoid choosing securities having higher transaction cost and prefer to select such securities in their portfolio whose transaction costs are low but returns are not so much different.

Amihud and Mendelson(1986) demonstrated the relationship between expected returns and transaction costs. The increase in the expected return of a security is not directly proportional to increase in transaction cost.Therefore the expected return is an increasing and concave function of transaction cost (Amihud et al., 2005). Short term investors are more exposed to transaction costs as compared to long term investors. Investors having greater holding period earn liquidity premium in their expected return and this premium is more than anticipated transaction costs due to high spread stocks in portfolio.

2.3.2 Asymmetric Information

According to market micro structure Asymmetric information is another source of liquidity risk. There are two types of investors in the stock market informed investor and uninformed investor(Amihud et al., 2005). All the trading parts do not contain same information one of trading parts has more private information as compared to the other trading parts. This non uniformity in information leads to trading loss for uninformed party. Private information is in various forms, one party has more knowledge about company fundamentals, future trades and prospects of markets in future relative to the other party.

Non homogeneous information is also a systematic risk, as informed investors always earn more relative to uninformed investors. Uninformed investors assign incorrect weight to stock with reference to holding. Moreover their expectation regarding risk and return are not right. O'Hara (2003) demonstrated the same in his paper. He shows investors portfolios on the basis of information vary. Un informed or less knowledgeable investors sometimes have awareness about market situations but decide not to trade lead to illiquidity in the market.

Brennan and Subrahmanyam (1996), Easley, Hvidkjear, and O'Hara (2002) O'Hara (2003) study prove that information costs and liquidity premium are associated with each other.Information costs including transaction costs, time costs incurred to get information about the investment in securities. Information costs take the form of liquidity premium in the expected returns of securities when compensation is required by security buyers in anticipation of having to trade with informed traders.

Brennan and Subrahmanyam (1996), reveal that liquidity costs is created for uninformed investors by those investors who possess private information. Easley et al (2002) and O'Hara (2003) realize that assets having more portion private information yield higher return due to risk premium in trading which is information based.

Asymmetric information is the source of earning profit on the sale and purchase of financial security. If the seller contains more information as compared to buyer, the security is overpriced to him. Similarly if more information is available to

buyer, the security is underpriced to him. This under pricing and overpricing of financial securities results in profit on their sale and purchase.

2.3.3 Search Frictions

The situation of market in which an investor wants to execute the transaction but buyers and sellers is not readily available. The investor in this scenario tries to quickly execute such unattractive trade and explore better attractive trade opportunity. This creates tradeoff between unattractive and attractive trade and thus originates the search costs in transaction. Moreover absent of trading opponent brings opportunity costs for the investor, as he or she is not able to do the desired transaction in the absence of other trading party (Amihud et al., 2006).

Weill (2008) predicts search cost is illiquidity cost. He shows that there exists correlation between cross-sectional changes in the number of tradable shares and cross sectional variation in stock returns. Higher the number of tradable shares, lower will be the search cost and illiquidity. Friction cost is a systematic risk because it depends upon market circumstances. Market liquidity and search costs have inverse relationship. When illiquidity exists in the market search cost increases as opponent party is not available to carry out the transaction. In such situation, to find out the opponent party for a trade is a challenge for the investor and he or she earn liquidity premium for assets fluctuated by liquidity risk.

2.3.4 Inventory Risk

The risk associated with selling of asset if natural buyer does not present in the market. In such condition investors force to sell their securities to market makers. They keep these securities in their inventory till buyers appear in the market and in return investor compensate the market makers for their role. In result demand pressure results because limited buyers exist in financial market. Market makers buy all the assets and bear the risk of storing the inventory as well as price changes. Therefore seller has to face a high cost because market makers receive huge compensation while bearing these risks. As a result bid ask spread increases

and create illiquidity in the market (Amihud and Mendelson, 1980; Brunnermeier and Pedersen, 2005).

2.4 Illiquidity Sources and Dimensions of Liquidity

The sources of illiquidity have originated various dimension of liquidity. An investor has to pay the spread for carrying out the trade in the financial market. This spread measures transaction cost and captures width, one of the dimensions of liquidity. The uninformed investors rarely participate in trading due to asymmetric information that lowers the frequency of trading of shares in the market. Low frequency trading created due to asymmetric information affects two dimensions of liquidity immediacy and depth because smaller amount of stocks are traded in financial markets and frequency of stock trading is also low. Investors spend a lot of time due to search friction for trade also affects the immediacy of liquidity.

Different illiquidity sources not only throw light on different dimensions but also open the path for introducing liquidity measures for various dimension of liquidity. The picture is not clear because it is not possible to identify which dimension of liquidity is associated with which source? The sources of illiquidity affect various dimensions of liquidity simultaneously. Stocks may be liquid in one dimension and illiquid in another dimension. For instance a stock having two features such as frequently traded in smaller quantity. Frequently trading shows that stock is liquid in nature whereas trading in a smaller quantity indicates stock illiquidity.

Kay (2008) demonstrated liquidity and illiquidity characteristics of a stock with the help of an example. A bond having 15% coupon rate and 8% market rate. The lowest market rate indicates the bond is premium bond and traded in the market more than its face value. Investor can earn high capital gain on selling the bond. On the other hand investor may hold the bond and take minimum risks because coupon payments are tax exempt. Capital gain is taxable which make a bond expensive for an investor to sell. This shows illiquid nature of the bond.

On the other side easily trading of bond in financial market indicates its liquid nature. Therefore it is not possible to use one liquidity proxy that incorporates all its attributes. Similarly, Amihud (2002) argued that it is very difficult to directly observe the liquidity and single measure cannot capture all its features. Moreover, Marschak (1938) gave a suggestion to measure the characteristics of liquidity separately. Chollete, Naes and Skjeltorp (2006) demonstrates that correlation exist among dimensions of liquidity and the stocks having all the dimensions are liquid are only liquid in nature.

Chollete et al. (2007) proposed liquidity proxies are of two types order based and trade based. Order based proxies have a focus on information about market orders. These incorporate all the available information about liquidity for future trade. Those liquidity proxies that measure the information about the execution of trade are trade based. Aitken and Comerton-forde (2003) assert that order based liquidity proxies are able to empirically explain variation in return with respect to time. Order based liquidity measures best capture the time based available liquidity.

Chollete et al. (2006) claim trade based measures are more relevant to measure liquidity. There are many reasons to support it. First one is the attitude of investors who place market orders but have no intention to trade at the prevailing market price. This also supports that order based data contains noise. Secondly order based liquidity measures require intraday or high frequency data that are very difficult to obtain especially in emerging markets whereas trade based liquidity proxies can easily be measured from the daily data.

Aitken and Comerton-forde (2003) and Chollete et al. (2006) argue that correlation between order and trade based liquidity proxies is low therefore liquidity proxies should be selected from both types. The current research is carrying on Asian markets including developed and emerging markets. The selected proxies for all dimensions are based upon low frequency data because high frequency data are not maintained in emerging markets. Therefore current research includes trade based liquidity proxies.

Multiple proxies of liquidity are used in the research to capture its various aspects

such as price impact liquidity, market breadth liquidity, market depth liquidity, market resiliency and time liquidity. All the trade based measures of liquidity are selected on the basis of the literature reviewed in the research.

2.5 Empirical Literature on Liquidity and Asset Prices

2.5.1 Liquidity Risk

Literature framework of the research is comprised of theoretical background of liquidity risks. Moreover Capital Asset Pricing Model (CAPM) and Liquidity Adjusted Capital Asset pricing model (LCAPM) will be discussed in this section of the research. The risk stems due to lack of swiftly trading of the stock is liquidity risk. The stocks cannot be traded easily without loss or loss cannot be avoided in speedily trading of stocks. Finance literature reveals two categories of liquidity risks funding liquidity risk and trading liquidity risk.

Bervas (2006) described Trading liquidity risk is derived from the market prescribing the situation of loss when investor liquidate the position in the absence of best price. Trading risk of liquidity depends upon the structure, participants and availability of information in the market. Trading liquidity risk is also termed as market liquidity risk.

Marrison (2002) revealed funding liquidity risk is associated with financial obligations of financial institutions. Financial institutions are not able to repay the debt and the risk of liquidity drainage originates in the whole financial market. The study discusses only trading liquidity risk and excludes the funding liquidity risk from its domain.

2.5.2 Trading Liquidity Risk in LCAPM Model

Liquidity adjusted Capital Asset Pricing model is composed of four trading liquidity risks. These are as follows:

2.5.2.1 Liquidity Level (LL)

Liquidity level is the liquidity risk arises due to extra cost associated with illiquidity and affects the stock returns(Amihud and Mendelsen, 1986; Vu et al.,2015 ; Kim Lee 2014).

2.5.2.2 Commonality in Liquidity (CL)

According to Acharya and Pedersen (2005) idiosyncratic factors like, trading volume, volatility, number of trades measure stock liquidity but market factors also contributes in determining of liquidity of individual assets. The portion of stock liquidity determined by factors of market is commonality in liquidity.(Chordia et al., 2000; Kim Lee,2014; Vu et al.,2015)

2.5.2.3 Flight to Liquidity (FL)

Liquidity risk originates when investors trade-off between holdings of illiquid assets with holding of liquid assets. They want to liquidate illiquid assets from their portfolio and include liquid assets in it. Therefore co-movement exists between stock return and market illiquidity. Investors prefer to take lower returns on liquid assets because the asset's return has positive covariance with market illiquidity (Pastor Stambaugh, 2003; Kim Lee, 2014; Vu et al., 2015).

2.5.2.4 Depressed Effect of Wealth (DW)

Depressed effects of wealth represent the liquidity risks arise due to co-movement between asset illiquidity and market return. Investors prefer to invest in these stocks whose illiquidity sensitivity is positive with market return in a down market. These stocks have lower trading cost and give lower returns (Acharya Pedersen, 2005; Kim Lee, 2014; Vu et al., 2015)

Empirical research in finance literature demonstrates the relationship among different liquidity risks and risk premium of equity and how these liquidity risks are connected with each other.

The empirical literature on liquidity risk and asset pricing starts from the paper of Amihud and Mendelson (1986). It is the first paper which analyses the impact of liquidity on asset prices. As the assumption of frictionless market is very useful in previous models of asset pricing in standard finance therefore academic research ignores the fact, the cost to trade the illiquid securities and investors want compensation for this cost.

Amihud and Mendelson (1986) investigated that investor bears a transaction cost for holding illiquid asset and the discounting of cash flows of illiquid securities include future transaction costs. The security having more illiquidity leads to increase it's before cost expected returns. This indicated that liquidity is priced in equities when investors are being compensated for transaction cost. The traces about the concept of liquidity in asset pricing, that inspired the Amihud and Mendelson (1986) to develop the complete paper on liquidity and asset valuation, stemmed from the paper of Ibbotson, Diermeier and Siegel (1984). They demonstrated the relationship among taxation, marketability and information costs and expected return. They conclude that non risk characteristics (taxation, marketability and information costs) of stock also affect expected securities return and price in addition to risk demonstrated in CAPM. The term marketability used in that paper reveals the concept of liquidity.

Amihud and Mendelson,s (1986) introduced many ideas in liquidity literature in finance. One of the ideas is Clientele effects, these effects are seen when long term investors choose relative illiquid securities in their portfolio as compared to liquid securities. Another idea introduced is related to expected return of security. The security expected return is comprised of more than just its risk. Expected return of security includes the liquidity of stock and the compensation an investor receive for transaction cost involved in trading that security.

Chordia, Roll, and Subrahmanyam (2000) introduced the concept of commonality in liquidity. The introduction of the concept of commonality in liquidity is another forward dive in liquidity literature. The liquidity of stock is influenced by market liquidity. There are many features of liquidity such as depth, breadth, resilience and time. These forces are highly correlated and affect all the securities. Liquidity

cannot be studied in isolation. They discuss many essential aspects of commonality in liquidity and quantify them. Market wide liquidity depends upon trend in the market either bullish or bearish trend exist in the market. Spreads vary according to market conditions. Spreads increase in bearish markets but decrease in bullish market.

Their research throw light on the fact, market wide liquidity is non diversifiable risk. The commonalty in liquidity stuck the traders in spite of distinctive features of individual security. The movement in market does not affect the securities in the same manner. Some securities are more sensitive to price movement as compared to other. However investors require more sensitive securities in their portfolio for higher returns.

O'Hara (2003) used microstructure asymmetric information model for asset pricing in her research. She incorporated asymmetric information in traditional asset pricing models and showed those assets whose valuation require access to private information can yield higher return as compared to those stocks whose valuation is done on the basis of publically available information.

Pástor and Stambaugh (2003) discovered the concept of liquidity beta, another forward dive in liquidity literature. Liquidity beta is defined as sensitiveness of securities to shocks in aggregate liquidity. This paper exposed the stock liquidity to market liquidity. Investors bear the risk of combined liquidity and earn high expected return. They conclude that high liquidity beta stocks have more than average returns and commonality in liquidity is priced in securities.

Acharya and Pedersen (2005) presented liquidity-adjusted CAPM model to incorporate the impact of liquidity risk on asset pricing. They introduced two aspects of liquidity, liquidity as a cost and liquidity as a risk. LCAPM used the word illiquidity instead of liquidity. They categorize the liquidity risk in to three portions or liquidity betas. These betas have an impact on asset pricing. The first beta β_1 indicate the covariance between stock illiquidity and market illiquidity.

LCAPM is the first model which predicts that this risk is priced in securities. β_1 has a positive relationship with stock returns because investors want positive

compensation for that stock whose illiquidity increases due to increase in market illiquidity. The β_1 is named as commonality beta in LCAPM. The second beta β_2 is the covariance between stock return and market illiquidity. β_2 is negatively related to stock return revealing investor is willing to accept low return on that security whose liquidity does not change when the market is illiquid.

The third beta β_3 is the covariance between stock return and market illiquidity. The relationship between stock return and β_3 is negative indicating the willingness of investor to accept low return on that security whose trading cost is low when market is not good that is bearish trend exists in the market. Therefore liquid stocks in a poor market are preferred by investors as these stocks can be traded at a premium.

Liquidity adjusted CAPM calculate the stock return as a function of illiquidity cost and four betas three new betas and one traditional CAPM beta. The present study employs LCAPM model to know these three liquidity risks are priced in Asian developed and emerging markets or not. The highly developed model in the literature of finance for explaining the expected return of security in the context of risk is LCAPM. The theme of this model is very simple and understandable.

Investor is compensated for liquidity risk just like other risk. Liquidity risk is multidimensional in nature investors may face that risk in the form of stock illiquidity, in the form of market illiquidity and in the form of commonality in liquidity. Lee (2011) investigated that liquidity risks are priced in international markets or not by applying Liquidity adjusted CAPM. He concluded that liquidity risks are priced and more important in international markets as compared to US.

2.6 Empirical Literature on Level of Liquidity

A lot of research is conducted on level of liquidity based upon Amihud and Mendelson (1986) in developed as well as emerging markets. These researches provide empirical evidence that there is a relationship between illiquidity level and equity returns.The words used in empirical literature to describe level of liquidity is liquidity, liquidity impact and illiquidity level.

In developed markets Lam and Tam (2011) investigated the relationship between liquidity and asset pricing in Hong Kong stock markets. They used nine liquidity proxies turnover ratio, trading volume, standard deviation of turnover ratio, standard deviation of trading volume, The coefficient of variation of turnover, the coefficient of variation of trading volume, Amihud illiquidity ratio and the standardized turnover-adjusted number of zero-trading days. They collected the data of 769 listed companies in Hong Kong stock markets from Pacific-Basin Capital Markets (PACAP) Databases for the period of 1984-2004. They compared Fama-French three factor model (market excess return, a size factor and a book-to-market factor with four factor liquidity (market excess return, a size factor and a book-to-market factor and liquidity and five factor liquidity model (market excess return, a size factor and a book-to-market factor, liquidity and momentum). Their study concluded that liquidity impact on asset pricing was highest among all the asset pricing factors in Hong Kong stock markets. Moreover multivariate regression indicated that liquidity four factor model was the best one among the three to explain the liquidity and asset pricing in that market. Their result also revealed that momentum factor has no contribution for asset pricing in Hong Kong stock market as compared to US market. Moreover, Nguyen and Lo (2013) wanted to know the stocks with low liquidity and high liquidity risk earn more return or not in New Zealand stock. They used seven measures of liquidity effective bid-ask spread, the quoted bid-ask spread, illiquidity measure, illiquidity proxy, price impact, share turnover, and dollar trading volume. The data from 1996-2011 of all the domestic stocks in New Zealand stock market collected from Thomson Reuters Tick History database. Their result revealed that there was no illiquidity premium in New Zealand Stock market and liquidity is not priced in that market. Firm specific factors such as size, book to market and momentum are priced in New Zealand stock market. Moreover they also found that liquid stocks have more returns as compared to illiquid stock that contrasts with the theory of Amihud and Mendelsen (1986). However, Bali et al (2013) demonstrated that under reaction is caused in developed markets of New York stock exchange, NASDAQ and American stock exchange due to shocks in level

of liquidity. The main reason for this under reaction of market is illiquidity and inattention of investors. Control variables like firm size, Level of liquidity, Book to market ratio, momentum and market risk have been used to show the relationship between liquidity level and excess equity returns using Fama-MacBeth regression. The study found level of liquidity shocks positively affects the returns at portfolio level that supports the Amihud and Mendelsen (1986).Kim and Lee (2014) investigated the pricing of Liquidity risk in developed stock markets like New York stock exchange and American stock exchange. He employed Liquidity adjusted CAPM and used multiple measures of liquidity like price impact, reversal measure of illiquidity, zero return proportional, turnover adjusted zero return, bid ask spread, effective spread, effective tick measure and trading cost from 1962-2011.Cross - sectional and factor model regressions indicated the strong evidence of existence of illiquidity level in developed stock markets. Moreover the findings of their research also concluded that liquidity risks are non-diversifiable in nature. Moreover Vu et al (2015) tested the impact of systematic liquidity risk on stock returns of Australian stock markets. Australian stock market is order driven market and its market micro structure is entirely different from US market. They used four proxies Turnover-adjusted number of zero daily volume, Zero-return measure, Return reversal measure and Turnover ratio for measuring illiquidity. They employed Liquidity adjusted CAPM model during 1995-2010. Data of stock price, trading volume, market index, market capitalization, number of shares outstanding, and monthly stock returns during the same time period collected. Panel regression employed which reflects the three liquidity risk mentioned in LCAPM priced in Australian Stock markets. Their paper also concluded that liquidity risk was eight times higher in bearish market as compared to bullish market. Dalgaard (2009) explored liquidity risk in Denmark. He used two liquidity proxies bid-ask spread and turnover rate for measuring the impact of liquidity on asset returns from the time period 1987 to 2008. Fama and Macbeth (1973) model employed on listed companies of Denmark in a cross-sectional framework. Moreover liquidity risk and asset pricing during the data period has also been studied. Their findings revealed that liquidity and liquidity risk both effect asset returns and liquidity is considered

as one of the risks priced in asset pricing in Denmark.

The studies conducted other than developed markets include Morken and Jerko (2012) examined the influence of illiquidity risk on stock returns in Oslo Stock exchange. They checked the cross sectional and time series variation and correlation among 13 illiquidity measures such as Amortized spread, trading volume, value, turnover, zero trade ratio, Amihud measure, Liquidity ratio, Amivest measure, Liu measure, size, Absolute spread, relative spread and amortized spread. Portfolios of high and low liquidity are constructed and Fama-MacBeth regressions are applied. Regression results showed illiquidity risks are priced in Oslo Stock exchange. The highest contribution for capturing liquidity risk among illiquidity risk measures is turnover. Moreover they concluded that LCAPM better explains the expected returns as compared to traditional CAPM. However Minovic and Zivkovic (2010) checked the effect of illiquidity and liquidity risk on price formation in frontier financial market Siberia by applying conditional liquidity adjusted CAPM model. They used zero return as liquidity measure and GARCH is employed on 200 listed companies of Belgrade stock exchange covering the time period of 2005-2009. They concluded that pricing in one of the frontier markets included illiquidity risk as risk premium. Jun and Ying (2014) empirically investigated the emerging Chinese Stock markets in the context of liquidity and asset pricing. They applied the Fama- French three factor model and modified Fama-French model including liquidity and momentum for explaining the impact of liquidity on expected returns of non financial A shares. Their research selected 825 non financial A shares, 425 from Shanghai stock market and 400 from Shenzhen stock market in Chinese stock market. Multivariate regression showed that the best model to explain the expected return in Chinese stock market is liquidity four factor model. Momentum factor like Hong Kong stock market has no contribution in Chinese stock market for asset pricing. Moreover liquidity effect on small firm stock is high relative to large firm stock. Expected return of the security varied with level of liquidity and size of the firm. In line with Jun and Ying (2014), Wang and Kong (2010) discovered the relationship between illiquidity and asset pricing in Chinese stock market. They also expanded their study

and attempted to find out the best proxy for measuring illiquidity in Chinese stock market. According to microstructure theory they used intra -day, high frequency data and introduced illiquidity proxies for measuring illiquidity. These illiquidity indicators were considered as bench marks. They also used inter day, less frequency data for illiquidity proxies and evaluated these against bench marks. Illiquidity microstructure proxies were quoted spread, effective spread, intra- day price impact coefficient, Hasbrouck measure and inter-day impact coefficient and inter-day illiquidity proxies used were Amihud illiquidity measure, Amivest ratio, turnover, dollar volume and Pastor-Stambaugh ratio. Their findings revealed that turnover is the best illiquidity or highly priced indicator in Chinese stock market during the data period 2005-2007.

More than one emerging markets are collectively studied by Bekaert, Harvey and Lundblad (2007) in the context of liquidity impact on expected returns. They used zero return and time span of zero return period and turnover as measures of liquidity. They employed simple model for asset pricing containing market portfolio representing risk factors and transaction cost identifying liquidity. They also measured the correlation between liquidity shocks and return shocks to test either liquidity is priced in emerging stock market or not. Their study included 19 emerging markets Argentina, Brazil, Chile, Columbia, Greece, India, Indonesia, Koria, Malaysia, Mexiico, Pakistan, Phillipines, Portugal, Taiwan, Thailand, Turkey, Veneuzula and Zimbabwe. Vector auto regressions employed, depicting liquidity is an important element of asset pricing and there is co movement between liquidity shocks and expected returns.

Saad and Samet (2015) did a comparative study and tested conditional liquidity adjusted CAPM on common stocks in developed and emerging markets. They employed DCC-GARCH (1,1) on 49,351 common stocks in 60 and 23 developed and emerging markets covering the time period of 1985-2012. They used one illiquidity measure zero return proportion and exposed that local factors are strong determinant of illiquidity risks in both developed and emerging markets. The pricing of illiquidity risks in emerging market is strong as compared to developed markets. Moreover the monetary policy and liquidity funding have a great impact

on developed markets relative to emerging markets. The risk due to illiquidity has no time trend but it is more in a time period of financial crises.

Hirvonen (2016) explored the liquidity risks in Finnish stock market and employed conditional Liquidity adjusted capital asset pricing model using spread and Amihud measure during 1997-2015 on all the stocks listed in stock exchange of Finnish. DCC- GARCH model is employed in the study to estimate the time-varying liquidity risks. The results of the study reveals stock returns are affected positively with level of liquidity. Butt (2015) used unconditional version of Liquidity adjusted capital asset pricing model and found no relation between equity returns and level of illiquidity in Finnish financial market. In contrast to Butt (2015), Butt and Virk (2015) and Hongxing and Duduchoge (2017) found a significant impact of illiquidity level and illiquidity risks in Finnish stock market and Ghana stock exchange.Rehman Mangla (2018) found that market liquidity affect stock returns in an emerging market.

2.7 Empirical Literature on Commonality in Liquidity

In developed markets Korajczyk and Sadka (2008) applied latent models of liquidity and measure the effect of common component across the liquidity measures on asset pricing in New York stock exchange. A set of four measures of liquidity quoted spread, effective spread, share turnover and return to volume ratio and the data of 4055 firms over a time period of 1983-2000 is included in their research. They concluded that there existed a common component across liquidity measures that explained maximum variation in stock liquidity. Moreover it is also concluded that changes in liquidity levels are highly auto-correlated, verifying liquidity shocks are persistent in nature. Lee, Tseng and Yang (2014) explored commonality in liquidity in exchange traded funds of countries in U.S market. They calculated liquidity ratio (return to volume) to measure commonality in liquidity among exchange traded funds of 21 countries. Data covering the period of 2002 to 2013

has been taken from DataStream international database. Their empirical result concluded the strong impact of commonality in liquidity in exchange traded funds. Another contribution of this paper is it showed that commonality in liquidity of exchange traded funds changes with liquidity distribution Moreover the effect of commonality in liquidity in exchange traded funds was greater in financial crises as compared to non-financial crises during the data period. In swap market Mayordomo Moreno and Pena (2014) explored commonalities in liquidity during the time period 2005-2012. They used market model for measuring liquidity commonalities among twenty four countries by using liquidity measure relative Bid- Ask spread. They conducted the research on 401 non financial companies from five different economic areas. 224 firms from U.S, 82 firms from European Monetary Union, 39 firms from UK, 13 firms from Japan and 43 firms from others. Their result revealed that commonality in liquidity is independent of firm characteristics. It varied with market conditions. The commonality has a stronger impact when global risk, funding liquidity risk and counter party risk increased during the data period. Economic areas also affect the commonality in liquidity. Its effect on European swap market is greater as compared to other markets. Moreover asymmetries in liquidity commonalities exist; predicting market liquidity is stronger than industry specific liquidity. However Kim and Lee (2014) revealed 2.28% annual liquidity commonality premium for investors in U.S stock market.

Foran, Hutchinson and Sullivan (2015) showed the impact of liquidity shocks on asset pricing by using tick data of 12 year period in UK. The market microstructure of UK is entirely different as compared to U.S. They used four liquidity measures quoted spread, effective spread, turnover and Amihud trade impact and found commonality of liquidity positively priced in U.K by employing Principal component Analysis. Vu et al. (2015) also reported that liquidity commonality is the more prominent illiquidity risk in Australian stock market.

Empirical researches conducted other than developed markets include Erton and Okay (2012) who employed LCAPM model in Istanbul stock exchange (ISE) to know either liquidity risk is priced in ISE or not during the time period 2005-2012. They used Amihud measure for deciphering the liquidity risk in ISI. Cross sectional

regressions are applied on constructed portfolios and found that liquidity risk is priced in ISE. Moreover the main driver of liquidity risk in ISE is commonality in liquidity and each stock is affected by market shocks in ISE.

However Wang (2013) studied commonality in liquidity in the context of capital market integration. His paper used volatility, return and average cross market liquidity to measure liquidity commonalities. He conducted research on twelve Asian stock markets including eight emerging and four developed stock markets for doing comparative study. He studied commonality in liquidity in different market cycles including the bull, bearish and rebound characteristics of Asian stock market. The data selected for that purpose covered the time period of 2000-2010. 2000-2002 indicated downward trend, a strong bullish period in 2003-2007, global financial crises in 2007-2009 and rebound in 2010. The findings of his research were common factors brought variations in liquidity in Asian markets. Volatility, a factor of commonality in liquidity just like average market liquidity also contributed a lot for liquidity variation in Asian markets.

Regarding emerging market Tayah, Bino, Ghunmi and Tayem (2015) used low frequency daily liquidity measures to examine the commonality in liquidity in emerging market. The main reason for using low frequency liquidity measures is the non availability of high frequency data in emerging markets. All the liquidity measures except price impact used in their study provide evidence of commonality in liquidity across all portfolios. However the results of their study also showed weak commonality in liquidity across industries. Butt and Virk (2015) found liquidity commonality beta has been significantly priced in Finnish stock market due to illiquidity measure Amihud (2002) but in the context of zero return commonality beta is insignificant. It also reported that illiquidity measure Amihud (2002) is more suitable for measuring illiquidity risk in Finnish stock market as compared to other. Adittya (2017) empirically tested Liquidity adjusted capital asset pricing model in banking sector of Dhaka stock exchange during 2011-2015 and found that investors did not receive any commonality premium in the stock exchange of Bangladesh. However Hongxing and Duduchoge (2017) found negative significant liquidity commonality in Ghana stock market due to asymmetric

information.In addition to that, liquidity commonality risk is also prominent in Indian stock market Kumar and Misra (2019).

2.8 Empirical Literature on Flight to Liquidity

Liquidity shocks or fluctuations in liquidity induce the investors to move towards high liquid stocks making the low liquid stock extremely liquid. Therefore liquidity level together with liquidity shocks contributes in liquidity premium. This observable fact is flight to liquidity and is demonstrated by Acharya and Pedersen (2015), Vayanos (2004) and Amihud (2002).

Naes et al.(2011) investigated flight to liquidity and flight to quality in periods of recession. Investors replace holdings of illiquid assets with liquid assets before liquidity reaches to worst condition. They hold liquid assets in their portfolio in economic downturns and liquidate those whose liquidity is assumed to be poor in market illiquid situation. Their study found flight to quality and liquidity work as catalyst speeding in bringing the market illiquidity to the worst level.

Petkova, Akbas and Armstrong (2011) used Amihud ratio (2002) to examine volatility in liquidity in American stock exchange and New York stock exchange. Their results, after controlling various sub periods and risk factors, show positive relationship between stock returns and volatility in liquidity. Angelidis and Andrikopoulos (2010) examined the determinants of expected returns in London stock exchange during the data period 1987-2007. Their study concluded that liquidity and idiosyncratic risks are the factors influencing the returns of London stock exchange. Moreover their study also shows the effect of liquidity shocks in the behavior of investors. Liquidity shocks at first affect the trading of large cap investors and then market liquidity shock information is incorporated in the trading of small cap investors.

Chen et al. (2016) measured flight to liquidity in New Zealand stock exchange and American stock exchange using TC factor (total trade volume of stock to trade volume quintile) during 1967-2013. Their study revealed that TC factor explained

the contribution of liquidity shocks in cross sectional returns of developed markets. Moreover flight to liquidity risk of LCAPM model has been priced in these financial markets. Lee (2011) found that flight to liquidity beta is not priced in all sub samples at global level. Kim and Lee (2014) found positive significant flight to liquidity beta in U.S stock market.

In emerging market, Butt (2015) and Butt and Virk (2015) found flight to liquidity risk is priced in Finnish stock market. In contrast to Finnish stock market, Hongxing and Duduchoge (2017) found insignificant flight to liquidity beta in Ghana stock market.

2.9 Empirical Literature on Depressed Wealth

According to Acharya and Pederson liquidity risk arises due to co-movement between stock illiquidity and market return. Investors want to invest in those stocks which remain liquid in down market. In down market situation the stocks that can easily be traded are really valuable stocks for investors. Wagner (2011) demonstrated that another channel of liquidity risk arises when investors sell their high liquidity provision stocks and accept lower return for such stocks whose expected return will be high in down market.

Acharya and Perderson (2005) identified and empirically tested this liquidity risk in New York stock exchange and American stock exchange for the first time. Their findings revealed that depressed wealth risk is priced in these developed markets. Moreover Lee (2011) also empirically tested this liquidity risk in 48 countries. Out of 48 countries 26 were emerging markets and 22 were developed markets. Thailand, Peru, Pakistan, Poland, South Korea, Hungry, Greece, Chile, Malaysia, Sri Lanka, Israel, South Korea, Taiwan, Zimbabwe, Mexico, Argentina, Philippines, South Africa, Turkey, Venezuela, Brazil, Columbia, Czech Republic, India, South Korea and Argentina were selected as emerging markets for the study. Developed markets for the study were Spain, United States, Singapore, Belgium, Germany, Japan, Italy, Denmark, Sweden, Canada, Luxemburg, United Kingdom, Austria, Switzerland, New Zealand, Netherlands, Hong Kong, Australia, Finland, Ireland,

Norway and France. Lee showed that this liquidation risk is negative and significant in developed as well as in emerging capital markets. Saad and Samet (2015) employed conditional version of liquidity adjusted capital asset pricing model globally and found that premium for depressed wealth effect beta is more prominent as compared to other individual risk's premium. They estimated the contribution of depressed wealth beta towards overall liquidity premium is 71% at global level. Hence depressed wealth risk has also been empirically tested for Australian markets by Vu, Chai and Do (2015). Their results also in line with lee (2011) that Australian market price this liquidation risk and this liquidity risk is negatively significant in Australian market. However in Ghana stock market Hongxing and Duduchoge (2017) found insignificant depressed wealth effect.

2.10 Empirical Literature Against Liquidity Premium

Old Liquidity literature is a conventional work on liquidity done on the foundation of CAPM, APT and ICAPM .Constantinides (1986) demonstrated that transaction cost generates a very little risk premium concluding transaction cost has no significant influence in asset pricing. Moreover the study also showed that bid ask spread is not the first order influence on asset pricing because investors usually reduce trading frequency during high transaction cost and have long holding periods. Sadka (2003) has strongly criticized no liquidity Premium approach. The phenomenon of keeping the constant transaction cost of trading in financial market is not possible.

Eleswarapu and Reinganum (1993) indicated that there is correlation between liquidity premium and January because the study found positive liquidity premium in January only. The connection of January and liquidity premium creates a doubt in relationship between liquidity risk and asset pricing. Chalmers and Kadlec (1998) investigated that the influence of transaction cost in asset pricing is overemphasizing. The influence of transaction cost on returns of assets having shorter holding periods is more as compared to assets having greater holding periods.

Although there are few studies (Constantinides, 1986; Sadka 2003; Eleswarapu Reinganum,1993; Chalmers Kadlec, 1998 that are against the liquidity premium but various studies (Vu et al.,2015; Kim Lee,2014) and Financial Model(Acharya and Pedersen, 2005) provide empirical support for the presence of liquidity premium in asset pricing.

2.11 Theoretical Framework

This section of the research illustrates Capital Asset pricing model along with its deficiencies. Moreover it also demonstrates the Liquidity Adjusted capital asset pricing model.

Finance literature show renowned models for the valuation of securities. First famous model developed by Sharp and linter is Capital Asset Pricing Model (CAPM). CAPM attempts to capture the market perception of risk and return. CAPM is empirically tested by using the beta to compare the variability of expected return of security with the unpredictability of return in market. CAPM has been critically criticized on the ground of insufficient measure for explaining expected return of securities. Beta is not a complete measure of capturing risk an investor faces in his or her investment. Hansen and Jagannathan (1997) criticized the CAPM model by demonstrating that portfolios having securities of small capitalization produce more returns relative to those predicted by CAPM. This puzzle has created a new path for further models to be developed for accurate asset pricing. In response to fill such a gap Arbitrage Pricing Theory (APT) has been developed by Stephen Ross. This model attempts to capture the missing component of risk. APT removed beta and introduced various proxy of risk to encounter the true risk of investor.

Arbitrage Pricing Theory discovers factors for predicting returns accurately. Study of Banz (1981), Research of Rosenberg, Reid, and Lanstein (1985), and Fama and French (1992) paper used various factors instead of Stock beta for explaining future returns. One of such factors is liquidity. Liquidity is a risk when an investor finds a difficulty in transferring the ownership of securities. Recently more attention

is given to liquidity for finding the pricing of liquidity risk in securities (Chordia, Roll, and Subrahmanyam, 2002).

There exist unrealistic assumption in CAPM and APT that market is friction less that is, no transaction cost exists in trading any security but practically the scenario is entirely different. Market is not friction less. Two assets having same stream of cash flows trade in different prices in the same market. The main cause of this price differential is liquidity risk or illiquidity cost in trading of securities.

2.11.1 Capital Asset Pricing Model

Investors give no attention to change the value of single asset in a portfolio but their main concern is how to bring variation in their accumulated wealth and consumption. According to Capital asset pricing model (CAPM) proposed by sharp (1964), Linter (1965) and Mossin (1966) systematic risks are priced only. It is measured by β specifying the sensitiveness of stock return with respect to financial market. Investors usually invest in different classes of assets like bonds, derivatives, real estate and investment in international stocks in order to diversify their portfolio and consider systematic risk involve in these classes of assets. According to Jensen (1972) and Merton (1973) CAPM has some unrealistic assumptions like availability of loan at risk free rate, market is frictionless and investment decisions for one period contributed a lot in making capital asset pricing model (CAPM) inefficient. Therefore Capital Asset Pricing model is not able to explain the returns of assets correctly.

Many economists contributed a lot in the improvement of CAPM. Merton (1973) proposed ICAPM. Lucas (1978) and Breeden (1979) introduced Consumption capital asset pricing model. According to them CAPM not only values the equity but changes in wealth and consumptions opportunities are valued through CAPM as well. Conditional capital asset pricing model has also been introduced by Jangannathan and Wang (1996). They linked CAPM with investment. The change

in systematic risk leads to change in investment opportunities. The above mentioned models have discussed the correlation of systematic risk with asset return and consumption or wealth indicators.

Ross (1973) introduced Arbitrage Pricing Theory (APT) that measures the relationship of systematic risk and return through risk factors. Chen Roll and Ross (1986) incorporate macroeconomic factors as risk factors whereas Fama and French (1992) introduced firm specific factors as risk indicators. The factors influencing the expected return of assets are considered risk measures in Arbitrage Pricing Theory. Roll (1977) also identified the problem of finding out accurate proxies for risk factors. Beside these problems CAPM is the simplest model for explaining risk return relationship and is used as a benchmark for comparing the performance of other asset pricing models.

Cochrane (1992) proposed that various risk factors affect equity returns but CAPM has identified only one risk factor. This shows the room for the improvement of CAPM and various multifactor models have been introduced in the effort of missing this gap. The main problem lies is to find out the common risk factor that affect all the securities to be considered as measure of systematic risk. The inclusion of more risk factors in the model increases the explaining power for measuring the differences in return. Another problem lies is, if irrelevant factors are included in the model that will lead to erroneous improvement in CAPM and originates various statistical issues especially when the factors are correlated to each other.

In finance literature Mackinlay (1995) and Kothari, Shanken & Sloan (1995) criticized multifactors models for instance International capital asset pricing model (ICAPM) and APT fails to identify and define the risk factors clearly and empirical performance of consumption CAPM is not good. Economic rationale for the inclusion of risk factors is not given in Fama French Model but CAPM empirically performance is less as compared to Fama French model.

Sadka (2003), Acharya & Pedersen (2005) and Liu (2006) incorporate liquidity factor as a risk factor in CAPM that will lead to an improved version of CAPM model named as liquidity adjusted Capital asset pricing model.

2.11.2 Liquidity Adjusted Capital Asset Pricing Model

Liquidity literature in finance for instance the study of Amihud and Mendelson (1986) and Sadka (2003) reveal that liquidity proxy is incorporated in CAPM model in order to examine the influence of liquidity risk on return.

Another domain came to measure the influence of liquidity risk on return is the use of factor analysis. Common liquidity factors are generated through various liquidity factors. Chen (2005), Korajczyk & Sadka (2008) and Chollete et al (2006; 2007; 2008) added one or more common factors of liquidity in CAPM. Recent development came in incorporating the liquidity risk in CAPM is the use of algebraic method for measuring multidimensional aspects of liquidity for instance the study of Liu (2006) has been done in the latest context of liquidity.

Liquidity is added to CAPM through three different ways. First is the simple addition of liquidity factor in to CAPM; Secondly common liquidity factors are added in CAPM model through factor analysis; Thirdly various liquidity factors are algebraically measured and added to CAPM. The above studies belonging to different liquidity measuring methods empirically provide the evidence of liquidity risk premium and Liquidity adjusted model outperform as compared to CAPM.

The study attempts to test the liquidity adjusted CAPM model by using multiple measures of liquidity in Asian markets. Acharya and Pedersen's developed Liquidity Adjusted CAPM model in 2005. The main assumption used to derive this model is related to wealth constraint. Investors always maximize their expected utility within wealth constraint. The main difference between CAPM and LCAPM is the former assumes there is no trading cost or in other words it can be said that stock price is cost free but later model captures the transaction cost for trading the stock and stock price is no longer cost free. This model replaced trading cost free stock price with adjusted trading cost stock price. LCAPM model is presented as

$$E_t(R_{i,t+1} - C_{i,t+1}) = R_f + \lambda_t \frac{Cov_t(R_{i,t+1} - C_{i,t+1}, R_{M,t+1} - C_{M,t+1})}{Var_t(R_{M,t+1} - C_{M,t+1})} \qquad (2.1)$$

R_i = Stock return

R_M = Market return

C_i = Trading cost per stock price

Subscript t shows that the terms are conditional to available information during time t.

R_f = Risk free rate

The main assumption of unconditional CAPM model is constant conditional variance or constant individual risk premium. The mechanism of unconditional LCAPM model is illustrated below.

$$E_t(R_{i,t} - R_{f,t}) = E(C_{i,t}) + \lambda\beta_i^1 + \lambda\beta_i^2 - \lambda\beta_i^3 - \lambda\beta_i^4 \tag{2.2}$$

There are four betas in the LCAPM model. Acharya and Pedersen (2005) measured these betas through regression at portfolio level. The study employed regression between stock illiquidity and market return, market illiquidity and stock return, stock illiquidity and market illiquidity and market and portfolio in order to calculate betas. Portfolios designed in the study to estimate betas. According to Pastor and Stambaugh (2003), Acharya and Pedersen (2005), Korajczyk and Sadka (2008) liquidity is persistent. The model avoided autocorrelation in illiquidities and returns through innovations. Residual terms have been retrieved from an autoregressive (2.2) regression. The innovation indicated the difference between retrieved values and actual values of all the portfolios.

Betas presented in Equation (2.2) are illustrated below

2.11.2.1 β_i^1 (Market Beta)

It is equivocal to market beta used in capital asset pricing model (CAPM) but it includes illiquidity cost $c_t^M - E_{t-1}(c_t^M)$ in the denominator.

$$\beta_i^1 = \frac{cov(r_t^i, r_t^M - E_{t-1}(r_t^M))}{var(r_t^M - E_{t-1}(r_t^M) - [c_t^M - E_{t-1}(c_t^M)])} \tag{2.3}$$

2.11.2.2 β_i^2 (Liquidity Commonality Beta)

It is the covariance arising from market illiquidity and stock illiquidity in LCAPM model. β^2 is named as commonality beta. Chordia et al. (2001) revealed the positive relationship between expected return and commonality beta because investors want compensation for holding stocks whose liquidity declines due to declining liquidity in financial market. As investors are risk averse and they want compensation in the form of liquidity premium due to variations in illiquidity. Commonality beta is written as

$$\beta_i^2 = \frac{cov(c_t^i - E_{t-1}(c_t^i), c_t^M - E_{t-1}(c_t^M))}{var(r_t^M - E_{t-1}(r_t^M) - [c_t^M - E_{t-1}(c_t^M)])} \tag{2.4}$$

Hasbrouck and Seppi (2001), Coughenour and Saad (2004), Brock man, Chung, and Perignon (2009), Kamara, Lou and Sadka (2008) and Karolyi, Lee and Van Dijk (2012) tested commonality in liquidity on various stock exchanges and provided empirical proof for the pricing of commonality liquidity risk in financial markets.

2.11.2.3 β_i^3 (Flight to Liquidity Beta)

The third covariance in LCAPM model originates from stock return and market illiquidity. β_i^3 is also named as flight to liquidity. Pastor and Stambaugh (2003) is the founder of this covariance. According to them investors incorporates illiquidity premium when they pay higher prices for such security that provide high returns when the market is illiquid. It is anticipated that negative relationship exists between expected returns and flight to liquidity because investors accept lower returns for that security that has high returns in illiquid market situation. The mechanism of β_i^3 is represented below.

$$\beta_i^3 = \frac{cov(r_t^i, c_t^M - E_{t-1}(c_t^M))}{var(r_t^M - E_{t-1}(r_t^M) - [c_t^M - E_{t-1}(c_t^M)])} \tag{2.5}$$

2.11.2.4 β_i^4 (Depressed Wealth Effect Beta)

The fourth covariance between stock illiquidity and market return is identified by Acharya and Pedersen (2005). It is represented by β_i^4. It is also named as depressed wealth. The theory for this covariance is new and has been tested in few studies. The proposed theory for this covariance is investors pay a premium for the security that is liquid when market return is poor. The relationship of depressed wealth effect and expected return is negative because investors incorporates illiquid premium through accepting lower returns for that security which is liquid in a down market. The statistical representation of β_i^4 is illustrated below.

$$\beta_i^4 = \frac{cov(c_t^i - E_{t-1}(c_t^i), r_t^M - E_{t-1}(r_t^M))}{var(r_t^M - E_{t-1}(r_t^M) - [c_t^M - E_{t-1}(c_t^M)])} \tag{2.6}$$

Brunnermeier and Pedersen (2008) and Wagner (2011) examined the effect of depressed wealth on expected returns and found this channel of liquidity risk is also priced in financial markets.

2.11.2.5 β_i^5 (Aggregate Liquidity Beta)

It shows the combined effect of three liquidity risks including commonality beta, Flight to liquidity beta and depressed wealth effect beta. It is represented as

$$\beta^{5i} = \beta^{2i} - \beta^{3i} - \beta^{4i} \tag{2.7}$$

2.11.2.6 β_i^6 (Total Systematic Risk)

Aggregate Systematic risk including level of liquidity, commonality in liquidity, flight to liquidity and depressed wealth effect is represented by β^6. It is written below.

$$\beta^{6i} = \beta^{1i} + \beta^{2i} - \beta^{3i} - \beta^{4i} \tag{2.8}$$

Vu, Chai and Do (2015) modified LCAPM model and includes momentum, book to market ratio and firm size as control variables. Fama and French (1992), Benz (1981) and Chan et al.(1986) support these control variables that are included in LCAPM. Fama and French (1992) provide empirical evidence that variation in cross sectional returns of individual stocks can easily be explained by book to market ratio. Similarly Bayesian framework has been used in the study conducted by Kothari and Shanken (1997) to predict market returns in Dow Jones Industrial Index during 1926 to 1991through Book to market ratio. Benz (1981) examined that investors earn abnormal returns on small cap stocks as compared to large cap stocks. The abnormal returns on small cap stocks are due to another risk factor named as size effect. The findings of Reinganum (1991) are in contrast of Benz study. The study demonstrated that small cap stocks perform poorly in the period of economic crises and investors can gain abnormally on large cap stocks. Chan, Jegadeesh and Lakonishok (1996) predicted future performance of stocks with the help of their past performance in the study. Future returns of those stocks having higher past record will be high and considered phenomenon of momentum is important in explaining the returns of the securities. The above mentioned studies conclude that these control variables have a strong influence in estimating future returns. Therefore the addition of these control variables will also enhance the explaining capacity of original Liquidity adjusted capital asset pricing model (LCAPM).

Vu, Chai and Do (2015) proposed seven specification of LCAPM model. These are illustrated below.

$$r^i_{t+1} - r^f_{t+1} = \alpha_t + \lambda_1 \mu^i_t + \lambda_2 \beta^{1i}_t + \varphi_1 BM_t + \varphi_2 SIZE_t + \varphi_3 MOM_t \tag{2.9}$$

$$r^i_{t+1} - r^f_{t+1} = \alpha_t + \lambda_1 \mu^i_t + \lambda_2 \beta^{1i}_t + \lambda_3 \beta^{2i}_t + \varphi_1 BM_t + \varphi_2 SIZE_t + \varphi_3 MOM_t \tag{2.10}$$

$$r^i_{t+1} - r^f_{t+1} = \alpha_t + \lambda_1 \mu^i_t + \lambda_2 \beta^{1i}_t + \lambda_3 \beta^{3i}_t + \varphi_1 BM_t + \varphi_2 SIZE_t + \varphi_3 MOM_t \tag{2.11}$$

$$r^i_{t+1} - r^f_{t+1} = \alpha_t + \lambda_1 \mu^i_t + \lambda_2 \beta^{1i}_t + \lambda_3 \beta^{4i}_t + \varphi_1 BM_t + \varphi_2 SIZE_t + \varphi_3 MOM_t \tag{2.12}$$

$$r^i_{t+1} - r^f_{t+1} = \alpha_t + \lambda_1 \mu^i_t + \lambda_2 \beta^{1i}_t + \lambda_3 \beta^{5i}_t + \varphi_1 BM_t + \varphi_2 SIZE_t + \varphi_3 MOM_t \tag{2.13}$$

$$r^i_{t+1} - r^f_{t+1} = \alpha_t + \lambda_1 \mu^i_t + \lambda_2 \beta^{1i}_t + \lambda_3 \beta^{6i}_t + \varphi_1 BM_t + \varphi_2 SIZE_t + \varphi_3 MOM_t \quad (2.14)$$

$$r^i_{t+1} - r^f_{t+1} = \alpha_t + \lambda_1 \mu^i_t + \lambda_2 \beta^{1i}_t + \lambda_3 \beta^{2i}_t + \lambda_4 \beta^{3i}_t + \lambda_5 \beta^{4i}_t + \varphi_1 BM_t + \varphi_2 SIZE_t + \varphi_3 MOM_t \quad (2.15)$$

The current study attempts to test the LCAPM model with seven specifications in Asian stock markets including Pakistan, India, China, Japan and Thailand from July 2005 to June 2015.

2.12 Hypotheses

Hypothesis generated from LCAPM model are illustrated below. First hypothesis is based upon Chordia et al. (2001) assertion. Second hypothesis is based upon notion of Pastor and Stambaugh (2003) and last three hypotheses are based upon assertions proposed by Acharya and Pedersen (2005).The rationale for investing three liquidity risks individually and collectively is that these risks exhibit different behavior at individual level and aggregate level. The main hypothesis developed from LCAPM model is shown in the study at first. After that country wise hypotheses are given below

H1: There is a positive relationship between stock returns and covariance of stock liquidity with market liquidity

H1a: There is a positive relationship between stock returns and covariance of stock liquidity with market liquidity in Pakistan stock market (PSX 100).

H1b: There is a positive relationship between stock returns and covariance of stock liquidity with market liquidity in Japan stock market (TOPIX 100).

H1c: There is a positive relationship between stock returns and covariance of stock liquidity with market liquidity in China stock market (SZSE 100).

H1d: There is a positive relationship between stock returns and covariance of stock liquidity with market liquidity in India stock market (NIFTY 100).

H1e: There is a positive relationship between stock returns and covariance of stock liquidity with market liquidity in Thailand stock market (SET 100).

H2: There is negative relationship between stock returns and co-movement of market returns with stock liquidity.

H2a: There is negative relationship between stock returns and co-movement of market returns with stock liquidity in stock market of Pakistan (PSX 100).

H2b: There is negative relationship between stock returns and co-movement of market returns with stock liquidity in stock market of Japan (TOPIX 100).

H2c: There is negative relationship between stock returns and co-movement of market returns with stock liquidity in stock market of China (SZSE 100).

H2d: There is negative relationship between stock returns and co-movement of market returns with stock liquidity in stock market of India (NIFTY 100).

H2e: There is negative relationship between stock returns and co-movement of market returns with stock liquidity in stock market of Thailand (SET 100).

H3: There is negative relationship between stock returns and co-movement of stock liquidity with market returns.

H3a: There is negative relationship between stock returns and co-movement of stock liquidity with market returns in Pakistan stock market (PSX 100).

H3b: There is negative relationship between stock returns and co-movement of stock liquidity with market returns in Japan stock market (TOPIX 100).

H3c: There is negative relationship between stock returns and co-movement of stock liquidity with market returns in China stock market (SZSE 100).

H3d: There is negative relationship between stock returns and co-movement of stock liquidity with market returns in India stock market (NIFTY 100).

H3e: There is negative relationship between stock returns and co-movement of stock liquidity with market returns in Thailand stock market (SET 100).

This research also investigates the combined impact of liquidity risks (stock liquidity, market liquidity and commonality in liquidity) on stock returns of Asian emerging and developed markets. The fourth hypothesis of the research is

H4: Aggregate liquidity risks are priced in stock markets.

H4a: Aggregate liquidity risks are priced in stock market of Pakistan (PSX100).

H4b: Aggregate liquidity risks are priced in stock market of Japan (TOPIX100).

H4c: Aggregate liquidity risks are priced in stock market of China (SZES100).

H4d: Aggregate liquidity risks are priced in stock market of India (NIFTY100).

H4e: Aggregate liquidity risks are priced in stock market of Thailand (SET100).

H5: Aggregate Systematic Risks are priced in stock markets.

H5a: Aggregate systematic risks are priced in stock market of Pakistan (PSX100).

H5b: Aggregate systematic risks are priced in stock market of Japan (TOPIX100).

H5c: Aggregate systematic risks are priced in stock market of China (SZES100).

H5d: Aggregate systematic risks are priced in stock market of India (NIFTY100).

H5e: Aggregate systematic risks are priced in stock market of Thailand (SET100).

Chapter 3

Data Description and Methodology

This section reveals about the importance of Asian markets because the study selects emerging and developed markets from Asia for study Population, sample, data set, data screening selection of liquidity proxies and operational definition of illiquidity measures used in the study. Moreover the data set and methodology used in the study has been described in this section.

3.1 Asian Stock Markets

Lisa smith[1] discussed the importance of Asian markets and investment opportunities available there. The Asian markets are comprised of developed and emerging stock markets. Japan is referred as developed country in Asia. Major players in Asian stock markets include China, India and Thailand along with Singapore, Hong Kong and Taiwan due to rapid industrialization started since 1960s. These nations export mass-produced products and are doing continuous efforts to become a high -tech arena. These features enabled the emerging economies to be entered as global market and attract the investors for investment. China and Thailand

[1]https://www.investopedia.com/articles/stocks/10/introduction-asian-financial-markets.asp

are included in those economies that export power houses. Gross domestic product of these economies is rising and double- digit stock returns in these emerging financial markets make these economies highly attractable for investors. MCSI[2] declared Pakistan as the best emerging market in 2015. Moreover Pakistan is in the list of top ten best performing emerging markets and is recognized as the best hidden frontier market due to 16% consistent growth in last five years. In market microstructure literature market[3] design has a great influence on price formation process that affects liquidity. Order- driven markets show orders of buyers and sellers along with their prices and quantity they are willing to buy or sell.

In order-driven markets market makers are not involved. This trading system is fair, transparent and any investor can easily access it. Therefore order-driven Asian markets are selected for the study.

3.2 Population

All the non-financial firms listed in Asian Stock Market are the population of the study.

3.3 Sample

It is very difficult to study each and every non-financial firms listed in Asian stock market due to time constraint. Therefore Realized volatility approach has been used in the study in order to obtain the sample of actively traded stocks having reliable high frequency return observations. The study follows the Dunne et al. (2011) and Papavassiliou (2013) sample approach that employed sub-sample of data set. They chose continuously listed blue chip companies on the basis of market capitalization in ATHEX 20. The study follows the same approach and selects the continuously listed non-financial firms on the basis of market capitalization in index.

[2]Pakistan Economic Survey 2008-09.

[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.

An index reflects the performance of overall stock market. It is composed of stocks representing the whole market. Therefore all the non listed firms included in the index of order-driven Asian stock markets including Pakistan, India, China, Japan and Thailand during time frame July 2005- June 2015 are the sample of the study. The study selected these Asian stock markets on the basis of their importance on investment, easily availability of data, common market design and availability of 100 stock index to represent the availability of overall stock market. The study uses balanced Panel.The sample period of the study is July 2005-June 2015. As the SET 100 index is developed on April 2005. Therefore the study started the sample period from July 2005. The study has avoided the financial crises of Asia in late 1990's and its related issues till 2003 (Wang, 2013). Companies that remain the part of index during the sample period of ten years are selected on the basis of market capitalization. The details of the sample used in the study are discussed below.

3.3.1 Asian Stock Market Indexes

- **Pakistan Stock Exchange (PSX100)**

  It is composed of 22 financial and 78 non-financial firms that are selected on the basis of market capitalization. It was developed on 1st November 1999. Non-listed firms that remain in the index from July 2005- June 2015 are the sample for the study. Moreover the study adopts Vu et al (2015) and Foran et al (2015) selection criteria for the selection of non financial firms as a sample for the analysis of study.

- **National Stock Exchange (NIFTY 100)**

  Nifty 100 is comprised of 18 financial and 82 non-financial firms. The expected sample for the study is the non-financial firms that remain in the Nifty 100 during time frame of the study. All the firms including financial and non financial selected on the basis of market capitalization in NIFTY 100. It was developed on 1st January 2003.

- **Shenzhen Stock Exchange (SZSE 100)**

  SZSE 100 includes 12 financial and 88 non financial firms. The study includes those non financial firms that show its continuous presence during the sample period as a sample for the study. The index tracks the performance of largest market capitalized shares. It was developed in 1st December 2002.

- **Tokyo Stock Exchange (TOPIX 100)**

  TOPIX is market capitalization-weighted free-float adjusted index. It reflects the performance of 100 largest market capitalizations firms. This index acts as bench mark for investment in Tokyo stock exchange. TOPIX 100 was developed in 1st April 1998. Same procedure for the selection of non-listed financial firms in TOPIX 100 has been adopted for the sample of the study.

- **Stock Exchange of Thailand (SET 100)**

  SET 100 index is developed on 30th April 2005. SET 100 index acts as a bench mark index for the performance of Thailand stock exchange. SET 100 includes top 100 companies based upon market capitalization.

3.4 Data

Data of daily stock prices, trading volume of Asian stock markets including Pakistan, India, Japan, China and Thailand stock markets has been collected from yahoo finance, ADVFN, Open door, Thomson Reuters, Business recorder and investing.com. Data of Number of shares outstanding has been collected from annul reports and websites of companies. The sample period for the study is comprised of daily data of 10 years from July 2005-June 2015.

3.4.1 Data Screening Procedure

The study needs the sample of successful companies that have contributed liquidity in Asian stock markets during the sample period.Therefore the mechanism adopted for screening of data is similar to Chordia et al (2000), Pastor and Stambaugh

(2003) and Haung and Haung (2005), Vu et al (2015) and Foran et al (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 negative market capitalization and book to market ratio should also be excluded from the sample.
- For the calculation of monthly illiquidity measure 15 valid observations are essential during the month.
- The values of the stock during delisting year should also be excluded.

The stocks meeting the above criteria are selected as a sample for empirically testing the liquidity adjusted Capital Asset Pricing Model (LCAPM) in Asian stock markets covering the time span July 2005-June 2015.

In addition to these

- The study has excluded all the non trading days from the data. Non-trading days includes all the public holidays in selected Asian Countries.
- Penny stocks whose closing prices are less than one creating noise in stock market. Data of the study has removed these penny stocks to control noise and avoid the bias results.

3.5 Sample Size

The table shows Sample Size before and after data screening. Moreover Daily observations and monthly observations of sample size after data screening are described below. The stocks selected after screening of data are used for further analysis.

Asian Stock Markets	**Expected Sample Size**	**Actual Sample Size (after data screening)**	**Number of Daily Observations**	**Number of Monthly Observations**
Pakistan Stock Exchange (KSE100)	78	50	123,000	6,000
National Stock Exchange (NIFTY 100)	82	80	197,600	9,600
Shenzhen Stock Exchange (SZSE 100)	88	53	129002	6360
Tokyo Stock exchange (TOPIX 100)	80	64	157,056	7680
Stock Exchange of Thailand (SET 100)	80	54	124,632	6480
Total	4 08	301	731,290	36120

3.6 Liquidity Proxies for Measuring Multi-dimensional Concept of Liquidity

Saar and Lybek (2002) and Liu (2006) proposed liquidity is a multidimensional that classifies liquidity measures in to three categories.

- Price impact measures
- Transaction cost measures
- Volume based measures

Different liquidity proxies are used to measure various features of liquidity. As liquidity is multi dimensional some proxies are designed to measure the transaction cost feature of liquidity while others are designed to measure the market impact, price impact, breadth and depth aspects of liquidity. Single variable of liquidity to measure all the features of liquidity (depth, breadth, resiliency, tightness and immediacy) is not available in finance literature. Moreover Liquidity proxies on the basis of frequency are categorized in to low and high frequency liquidity measures. End of the day data is used in low frequency liquidity measures where as the intraday observations of each and every trade are maintained in high frequency data (Bundgaard Ahm 2012).

The details of liquidity measures used in empirical literature to capture multidimensional liquidity aspects are illustrated below.

3.6.1 Price Impact Liquidity Measures

The measures that capture the movement of orders to intrinsic or equilibrium prices of securities are regarded as price impact measures. These measures are used to measure the resiliency and breadth aspects of liquidity in financial markets.

To capture the market breadth Sarr and Lybek (2002) use Hui-Heubel liquidity ratio to measure the impact of price on trading volume of shares. This ratio used 5 day period to observe short term price movements in financial markets. High value of Hui-Heubel liquidity ratio indicates that stocks are illiquid and market

has no breadth. Xie and Chen (2007) used correlations including Pearson, Partial Pearson and Spearman in order to compare the low frequency and high frequency liquidity measures and found the performance of Hui Heubel liquidity ratio for measuring liquidity measure is best among them.

Sarr and Lybek (2002) also proposed that resiliency dimension of liquidity can easily be measured through Market efficient coefficient (MEC) It compares the variance of long period's return from short period's return. If there is no difference between long term and short term volatilities that will indicate resiliency in market. In resilient market price movement is faster and new equilibrium level can easily be achieved. For resilient market Market efficient coefficient (MEC) is near to unity but for illiquid market the value of MEC is far away from unity. In liquid markets continuous price movements have been seen even in the presence of new information. Broto Lamas (2016) used market efficiency coefficient (MEC) to measure the resiliency in fixed income markets of U.S.

Amihud (2002) measures illiquidity of stock in the financial market and captures price shock per unit volume. According to Goyenko et al (2009) Amihud is the best measure to grasp the price impact dimension of liquidity with respect to volume. It is able to measure the bulk trading of stock with no price impact on short notice. Amihud (2002) can easily be computed for all the shares by using daily data of return and volume. Another price, volume liquidity proxy, Amivest measure constructed in the same way by using return and volume, differ in many ways.

Amivest measure proposed by Cooper et al.(1985) used volume of shares where as Amihud measure used volume in dollars and measures illiquidity of stocks in a capital market. Both measures have one limitation these ratios do not incorporate the trading days having no return. Karolyi, Lee and VanDijk (2012) analyzed the commonality pattern of liquidity in 40 countries by using Amihud (2002). Pastor and Stambaugh (2003) designed liquidity measure gamma by using regression approach and measure change in price temporarily due to order flow. Lo and Nguyen (2012) used various liquidity proxies including PS price impact measure of liquidity and Amihud (2002) to measure liquidity effect on returns in developed

stock market. Petkova et al. (2011) investigated the relationship between volatility in liquidity and expected return using Amihud ratio.

Lesmond , Ogden and Trzcinka (1999) investigated liquidity by considering the proportion of zero return days among trading days of stocks. Zero return proportion is another illiquidity proxy and is named as LOT measure of illiquidity. Lee (2006) argued that informed investors would reluctant to trade if transaction cost of trading is too high. Therefore zero return days would be observed due to non-trading of stocks. Zero return includes zero volume and positive volume days. Days with zero return having positive volume show the days of noise trading that induce trading volume.

Bekaert, Harvey and Lundblad (2007) used zero measure for the pricing of liquidity risk in emerging markets. Sadka (2006), Watanabla and Watanable (2008) and Acharya and Pedersen (2005) found that price impact measures have a significant role in asset pricing. Lee (2011) also adopted zero measure of liquidity to measure the asset pricing globally.

Pastor and Stambaugh (2003) proposed another price impact measure induced through order flow is Pastor and Stambaugh (PS) measure of liquidity. Fluctuation in prices created temporarily through order flow. Symmetry information wave in a market forced the market maker to provide liquidity. In selling orders market makers lower the prices and get high expected return where as in buying orders they get compensation in the form of high prices. Larger return reversals are found in less liquid stocks because their prices go further away for their fundamental value. Lam and Tam (2011), Nguyen and Lo (2012), Spiegel and Wang (2005) used PS measure of liquidity for asset pricing.

3.6.2 Transaction Cost Liquidity Measures

The liquidity measures use for measuring the cost of trading the financial assets and executing the financial transaction in financial markets are classified as transaction cost measures for liquidity.

The cost associated with trading of securities in financial market is recorded as transaction cost. Transaction cost is a broader term and it is further classified as explicit transaction cost and implicit transaction cost. The costs for processing of orders including taxes and commissions are explicit transaction cost. The execution cost of transaction is the implicit transaction cost.

Shares are purchased and sold at ask and bid price set by market maker in a quote driven financial market. There are certain transaction costs and risks associated in processing the order. Among risks one is inventory risk, the value of inventory held may be changed. Another risk is information risk, an investor has private information that lead to negative profit when market maker having no private information trade with informed investor. Therefore bid and ask spread is measured on the basis of processing ordering or transaction cost, cost associated with inventory risk and Asymmetric information risk. Bid- Ask spread first of all proposed by Amihud and Mendelson (1986) and empirically tested that liquidity measure on asset pricing and concluded that Bid – Ask spread effect asset pricing in developed markets. Bid and Ask spread liquidity proxy was strongly criticized by many academicians. Roll (1984) explored that mostly trades are carried out in financial market within quoted spread where as bid and ask spread is calculated exactly at quoted spread. Therefore that liquidity proxy has measurement error. Peterson and Fialkowski (1994) argued that in New York Stock exchange less than half transactions are executed at quoted spread. Moreover only 10 percent correlation exists between quoted and effective spread. According to Haung and Stoll (1996) bid and ask spread does not measure transaction cost accurately. Aitken and Comerton –Forde (2003) point out that bid and ask spread is not considered as best liquidity measure.

Roll (1984) examined that price reflects all available information in an efficient capital market. Therefore changes in bid and ask spread is not possible with regards to trade and cannot measure the transaction cost accurately. Transaction cost can be determined accurately by computing the serial correlation in price changes. Goyenko (2006) empirically proved the effect of spread measures in asset pricing. Akram (2014) and Chikore et al. (2014) used bid and ask spread for

explaining the effects of liquidity on stock returns. Nguyen and Lo (2013) used effective spread and quoted spread as transaction cost measure aspect of liquidity in New Zealand stock exchange. These are high frequency measures and are usually adopted by for measuring liquidity in developed markets.

Fujimoto (2003), Hasbrouck (2009), Karojczyk and Sadka (2008) used monthly transaction cost measures and price impact measures for asset pricing in developed stock markets.

3.6.3 Volume Based Liquidity Measures

The measures consider volume to differentiate illiquid stocks from liquid stocks. Daily volume and turnover are the liquidity proxies that illustrate the difficulty in trading a particular stock. High turnover and volume indicate that stock is liquid and execution of large order is possible without moving the market. Depth and breadth aspects of liquidity can be measured by volume based proxies.

Another trade based measure to measure the multidimensional aspects like breadth, depth and immediacy of liquidity is turnover. This liquidity proxy is widely used by many researchers in their studies to know the liquidity risk in asset pricing. Ho and Chang (2015), Vu Chai and Do (2015) and Foran, Hutchinson and O'Sullivan (2015) used turnover to explain the asset pricing in china, Australia and UK stock markets. Stoll (1978) demonstrated the link of turnover with the inventory models of liquidity. Foster and Viswanathan (1990) showed the relationship of turnover with different pattern of trading models. In trading models liquidity exist during phases of vigorous trading having no large spread. Finance literature contains the contrasting view of literature as well. Subrahmanyam (2005) argued that turnover is a proxy of momentum rather than liquidity. The stocks having better recent performance may trade in large quantity and show high turnover as compared to poor performing stocks. Turnover is included in the study.

Chordia et al. (2001), Hasbrouck and Saar (2002), Hasbrouck and Seppi (2001), Trang (2013) and Chikore et al. (2014) used trading volume as one of the proxies in explaining the liquidity in financial markets. The external selling pressure

from uninformed traders leads to decrease the share price and unusually trading of high volume of stock results. High trading volume triggers the demand of the stock. Lee and Swaminathan (2000) demonstrated that trading volume is a liquidity proxy because it measures the relationship between turnover and stock returns on the basis of past performance of stock. According to them glamour stocks are high volume stocks and neglected stocks are low volume stocks. Trading volume and turnover are widely used in various researches conducted in the context of liquidity.

According to Hartian and Sitorus (2015) the benefit to include trading volume and turnover are twofold. Firstly these liquidity measures can easily be computed in emerging markets where high frequency data like bid and ask spread is not maintained. Secondly these proxies can be considered as more powerful in measuring liquidity as compared to spread. Marshall and Young (2003) argue that turnover measures liquidity better than spread.

Another multidimensional measure having capability to measure trading speed, trading quantity and trading cost is Liu's measure of liquidity. Liu's liquidity measure (2006) depicts that stock having high bid-ask spread, high return to volume stocks and less turnover are illiquid stocks. It is assumed in Liu's measure that investors do not want to hold illiquid stocks because they cannot be sold easily. The liquidity premium understates for stocks having long holding periods without solvency restriction. Kang and Zhang (2014) and Lam and Tam (2011) used Liu's multidimensional measure to measure liquidity in emerging markets and Hong Kong stock market.

Elusive concept of liquidity might be accurately measured by using high frequency data. However it is more expensive or cumbersome to acquire high frequency data. Therefore it is better to use low frequency liquidity measures Fong et al.,(2017).

From the above theoretical and empirical literature of liquidity proxies following liquidity proxies have been selected in the research. These are low frequency and trade based liquidity measures capturing different dimensions of liquidity. Secondly data of these low frequency liquidity measures are available in emerging as well as developed markets.

3.6.4 Liquidity Measures Selected for the Study

Low Frequency Trade Based Liquidity Measure	Formula	Dimension
Roll (1984)	Roll $= {}_{0}^{2}\sqrt{-Cov(\Delta P_t, \Delta P_{t-1})}$ when $Cov(\Delta P_t, \Delta P_{t-1}) < 0$ when $Cov(\Delta P_t, \Delta P_{t-1}) \geq 0$	 Tightness Resilience
Amihud (2002)	AR $= RVid_t = \lvert ERid_t \rvert / PVid_t$	Depth Resilience
Lesmond, Ogden & Trzcinka (1999) (LOT measure)	ZR = N/T	Depth Tightness
Hui-Heubel Liquidity Ratio	HHLR = P_{max}-P_{min}/P_{min} Turnover ratio	Breadth Resilience
Amivest Liquidity	AL = Average (Volume/$\lvert R_t \rvert$)	Breadth
Hasbrouk and Schwartz (1988) Market Efficiency Coefficient (MEC)	MEC = Var $(R_t)/T \times Var(r_t)$	Resilience
Turnover Ratio	TR = P.Q/S.P	Depth
Value Turnover Stoll (1978)	VT = P.Q	Depth

3.7 Construction of Variables

3.7.1 Dependent Variables

Stock return is the dependent variable for the research. Rt = ln (Pt / Pt-1) Rt = Return of stock for the time period t. Pt = Closing prices of the stock for the time period t Pt-1= Closing prices of the stock for the time period t-1

3.7.2 Independent Variables

Liquidity is a multidimensional concept. It is very difficult to capture liquidity risk by using a single proxy. The research has selected form the literature 8 measures of

liquidity for capturing various aspects of liquidity risk. One measures transaction costs. Price impact is measured by using five liquidity proxies and the remaining three are related to breadth and depth.

Proxy of liquidity for measuring transaction cost is illustrated below.

- **Roll Estimator Of Effective Spread (1984)**

  Most of the studies including Kim and Lee (2014) and Vu et al (2015) used Bid and Ask spread to measure transaction cost. Bid-ask spread measures percentage spread. It is defined as the difference between ask and bid prices. It is considered as one of the measures of determining implicit transaction costs. If the transaction costs of securities are high it will lead to higher percentage spread, trade will be reduced and the number of market participants will be abridged. Effective bid -ask spread cannot be find out in emerging or developing markets due to non availability of data related to quote and actual executed price. Therefore the study has adopted the Roll estimator, a tool to measure effective spread in emerging markets of Asia.

  Roll measures the effective spread by taking serial covariance of changes in prices because. It can be measured as

$$S = 2\sqrt{-Cov(\Delta P_t, \Delta P_{t-1})}$$

  Roll Estimator has estimated the transaction costs from observed prices without bid and ask price. The ratio does not consider the positive values of serial covariance in the sample. In the research a modified version of roll estimator developed by Goyenko et al (2009) is adopted.

$$Roll =_0^2 \sqrt{-Cov(\Delta P_t, \Delta P_{t-1})} \quad \text{when } Cov(\Delta P_t, \Delta P_{t-1}) < 0$$
$$\text{when } Cov(\Delta P_t, \Delta P_{t-1}) \geq 0$$

The increase in variance of change in prices leads to increase the transaction cost. Zero value of roll estimator indicates positive auto covariance. High value of Roll estimator indicates high transaction cost that will lead to the market less liquid.

3.7.2.1 Illiquidity Proxies for Measuring Price Impact

- **Amihud Measure (2000)**

  Amihud measure determines the price impact in the following way. According to Kyle (1985) market makers set prices on the bases of imbalance created in order flow. This is another way of capturing informed trading. There is a positive relationship between price change and net order flow and it is commonly called the price impact. Amihud illiquidity ratio is a proxy used for capturing the price impact and measures the cost associated with large trade.

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

  ER_{it} is the daily equity return at time, and P and V are the daily price and trading volume of the share during the time period July 2005 to June 2015. Glosten and Haris (1988) demonstrated that effect of asymmetric information on liquidity can easily be captured by using the price impact proxy derived by Amihud measure and Hasbrouck (2003) verified that this is the best proxy constructed from daily data for measuring the price impact. Amihud measure does not include trading days having zero volume. High value of Amihud ratio describes less volume of shares trade in the market and market is illiquid.

- **Zero return proportion measure of illiquidity**

  Lesmond et al (1999) introduced another proxy for measuring illiquidity. This proxy includes the days containing zero return due to illiquidity and high transaction cost. This illiquidity proxy is based upon two facts. Higher stock illiquidity tends to have zero volume and zero return days. When the transaction cost is high, informed investors does not trade and zero return days are observed.

$$\mathrm{ZR} = \frac{\mathrm{N}}{\mathrm{T}}$$

  N is number of zero return days of stock during the month and T is the number of trading days during the month. Low value of zero return indicates the proportion of zero return days is less and market is less illiquid.

- **Hui-Heubel Liquidity Ratio**

  The HHLR, a proxy use to measure various dimensions of liquidity such as breadth, price impact and resilience. Trading volume and their price impact are related in this ratio. This ratio is computed for a 5-day period to smooth the volatility.

$$\text{HHLR} = \frac{P_{max} - P_{min}/P_{min}}{\text{Turnover Ratio}}$$

  Higher the value of HHLR shows high illiquidity in market. Low value of HHLR indicates high breadth in market.

  $\mathbf{P_{max}}$: The maximum price of a security in last five days

  $\mathbf{P_{min}}$: = The minimum price of a security in last five days of week

  Volume (PQ): The total value of trading volume in last five days of week

  Price (SP): Average price (closing) of number of shares of a security traded in last five days of week

  High value of Hui-Heubel liquidity ratio demonstrates market is illiquid and less volume of securities is trading in the market.

- **Amivest Liquidity**

  Another proxy to measure the price impact aspect of liquidity is conventional liquidity ratio. It was developed by Cooper, Groth and Avera (1985). This ratio incorporates days having non zero returns. This formula is not defined for zero return days. Amivest ratio takes the average of non-zero return days.

$$\text{AL} = \text{Average}(V_t/|ER_{it}|)$$

  If the value of Amivest liquidity is low, price impact will be high indicating illiquidity in the market.

- **Market Efficiency Coefficient**

  Hasbrouck and Schwartz (1988) developed this proxy for measuring liquidity. Market efficiency coefficient differentiates long term price changes from short term price change in prices. Any new information influences the price of the security but in resilient market the transitory change to the price of security should be minimum. It is computed as

$$\text{MEC} = \frac{Var(R_t)}{T \times Var(r_t)}$$

$Var(R_t)$ = Variance of return in long run

$Var(r_t)$ = Variance of return in short run

T = No of shorter periods in longer periods

MEC value near to 1 indicates that market is resilient and the overreaction or under reaction to new information is minimum and volatility is low. On the other hand less than 1 value of MEC indicates excessive volatility. Excess volatility leads to less trading and illiquidity exist in stock markets.

3.7.2.2 Illiquidity Proxies for Measuring Volume

- **Turnover Ratio**

  Turnover ratio is used as a proxy to measure the market depth and breadth dimensions of liquidity in a similar manner as proposed by Datar ,Naik and Radcliffe (1998).

  It is defined as the ratio between value turnover and market capitalization. As proposed by Datar, Naik and Radcliffe (1998) low turnover ratio indicates illiquidity. It is the volume based measure and captures the breadth dimension of market liquidity.

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

  P.Q = Price and trading volume of stock

  S.P = Number of outstanding stock and average price

- **Value Turnover**

  Bensten and Hagerman (1974) and Stoll (1978) used value turnover as a proxy for measuring liquidity. It is designed by computing the sum of daily values of all the transactions.

$$\text{VT} = \sum \text{P.Q}$$

Liquidity has inverse relationship with turnover rate. Low turnover rate of any security indicate stock illiquidity.

3.7.3 Control Variables

The control variables included in the study are explained below

3.7.3.1 Firm Size

Firm size often describe as market capitalization of the firm. Market capitalization is determined through multiplying the current price of the equity with number of shares outstanding of the firm in the financial market. The firm size in Pakistan is the Rupees market value of shares outstanding for a firm. It is computed as

$$\text{Firm Size} = \ln(\text{Market Capitalization}) \times t$$

Where t is firm size at the end of month t.

The relationship between firm size and return is negative. As smaller firms are considered as risky therefore these firms allow investors to earn more rate of return as compared to large sized firms.

3.7.3.2 Momentum

In order to identify trends in the prices of equities momentum is measured. Momentum indicates that stock prices used to move in the same direction. It is measured as aggregate return of past consecutive 12 months with one month lag.

3.8 Methodology for the Research

The methodology designed for the research is comprised of fitting approach, innovation in illiquidity measures, beta estimation in portfolios and Panel regression with fixed effects.

3.8.1 Fitting Approach

The research includes time series and cross sectional data from July 2005- June 2015. Unit root test has been applied to test the stationary of data. Augmented Dickey Fuller test used in the research to test series are stationary. The series of return for all the stocks in data set is stationary. Illiquidity series of all stocks are not stationary. The stationarity test of illiquidity series, stock returns,firm size and momentum is shown in appendix. Therefore innovation in illiquidity measures in line with Lee (2011) and Vu et al.(2015) created to avoid autocorrelation in illiquidity series. Moreover Panel regression with fixed effect has been employed to test the seven LCAPM specifications. The main reason for the selection of Panel regression over Fama Macbeth (1973) cross sectional regression is the avoidance of statistical biases. Fama Macbeth (1973) cross sectional regression does not measure serial correlation. It only measures cross- sectional correlations. To measure serial as well as cross sectional correlation Panel regression suggested by Petersen (2009) is employed in the research during 2005-2015.

3.8.2 Autoregressive Process (AR2) for Innovation in Illiquidity

In financial markets the persistence of liquidity is a common problem due to autocorrelation. This can make the result biased. In order to solve the problem of autocorrelation we generated the residuals of each illiquidity ratio at stock level through autoregressive (AR 2) process. Residuals are used in the study for subsequent analysis because residuals are uncorrelated and solved the problem of persistence of liquidity. AR(2) process indicates the current value of illiquidity is based upon previous two values. Innovation in illiquidity as measured by (Lee 2011 and Vu et al 2015) has been illustrated below.

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

C_t^i is the illiquidity measure of stock i during monthly time period t. Number of lags in the autoregressive process is represented by x. μ_t^i is the residuals in illiquidity proxies for stock i during a month t. Innovation in stock illiquidity is represented as

$$\text{Stock Liquidity} = c_t^i - E_{t-1}(c_t^i)$$

3.8.3 Market Liquidity

Market liquidity is the sum of residuals of each illiquidity ratio generated through Autoregressive process (AR 2). All the selected stocks fulfilling the selection criteria in the index are used for computing market liquidity. The study uses different illiquidity proxies for the latent multidimensional concept of liquidity. The liquidity measures are Amihud Measure, Amivest liquidity, Hui-Heubel ratio, Market Efficiency Coefficient, Zero Return, Roll estimator and Turnover ratio. Market liquidity for each measure has been estimated separately because one ratio is different for another in calculation. Market liquidity is specified below.

$$\text{Market Liquidity} = c_t^M - E_{t-1}(c_t^M)$$

3.8.4 LCAPM Portfolio Beta Estimation

The study adopted the same mechanism for the calculation of betas as specified by Lee (2011), Vu et al.(2015) and Hutchinson and O'Sullivan (2015). LCAPM betas are calculated at portfolio level to mitigate the problem of noise. As individual stocks are noisy and makes the result incorrect. At first portfolios betas are calculated and assigned these betas to individual stocks of the particular portfolio.

3.8.4.1 Formation of Decile Portfolios

The procedure for the formation of decile portfolios is illustrated below

- On the basis of each illiquidity ratio all the stocks in the data set are ranked by liquidity level monthly.
- Ordering of stocks from lowest to highest liquidity level is done after ranking of stocks.
- Equally weighted decile portfolios are generated by sorting of stocks. Each portfolio now has stocks of similar liquidity levels.

LCAPM betas mentioned in equations (2.7) to (2.14) are calculated at portfolio level. At the start of the year study has designed ten portfolios from lowest to highest liquidity level on the basis of each illiquidity measure. In the study seven liquidity measures are used for multidimensional liquidity. Therefore decile portfolios are prepared seven times. Each decile portfolio shows the grouping of stocks of similar liquidity level for each illiquidity measure during July 2005-June 2015.

For each portfolio LCAPM betas presented in equation (2.7) to (2.14) are calculated by using 36 monthly observations. The computation of betas resulted in loss of data for 3 years. For empirical analysis monthly data of seven years has been used starting from July 2008-June 2015. Stocks are assigned these estimated loadings computed through portfolios.

For LCAPM betas shown in equations (2.5) to (2.8) r_i is the equally weighted portfolio returns, $c_t^i - E_{t-1}(c_t^i)$ is the residual of autoregressive (2.2) process of equally weighted illiquidity ratio for each portfolio. The residual of autoregressive (2.2) process of equally weighted aggregate market illiquidity of all the stocks (meeting the criteria mentioned above) composing Pakistan stock exchange index is measured through $c_t^M - E_{t-1}(c_t^M)$. $r_t^M - E_{t-1}(r_t^M)$ is the aggregate market return of all the selected stock (falling the criteria mentioned above) included in the index during time frame July 2005-June 2015.

The study follows the methodology of Lee (2011), Kim and Lee (2014) and Vu et al.(2014) and stocks as test assets have been used at regression stage. Individual stocks as test assets have been used for regression in order to avoid spurious result

(Brennan et al., 1998). Second main benefit to use stocks as test asset is ample observations can be achieved for regression. Moreover loss of potential information can be avoided which usually exist at portfolio level. Finally individual stock characteristics such as firm size can be controlled at stock level.

3.8.5 LCAPM Specifications

The study attempts to test seven LCAPM specifications proposed by Vu et al.(2015). LCAPM Specifications designed for the study are illustrated as

$$r^i_{t+1} - r^f_{t+1} = \alpha_t + \lambda_1\mu^i_t + \lambda_2\beta^{1i}_t + \varphi_1 SIZE_t + \varphi_2 MOM_t \tag{3.1}$$

$$r^i_{t+1} - r^f_{t+1} = \alpha_t + \lambda_1\mu^i_t + \lambda_2\beta^{1i}_t + \lambda_3\beta^{2i}_t + \varphi_1 SIZE_t + \varphi_2 MOM_t \tag{3.2}$$

$$r^i_{t+1} - r^f_{t+1} = \alpha_t + \lambda_1\mu^i_t + \lambda_2\beta^{1i}_t + \lambda_3\beta^{3i}_t + \varphi_1 SIZE_t + \varphi_2 MOM_t \tag{3.3}$$

$$r^i_{t+1} - r^f_{t+1} = \alpha_t + \lambda_1\mu^i_t + \lambda_2\beta^{1i}_t + \lambda_3\beta^{4i}_t + \varphi_1 SIZE_t + \varphi_2 MOM_t \tag{3.4}$$

$$r^i_{t+1} - r^f_{t+1} = \alpha_t + \lambda_1\mu^i_t + \lambda_2\beta^{1i}_t + \lambda_3\beta^{5i}_t + \varphi_1 SIZE_t + \varphi_2 MOM_t \tag{3.5}$$

$$r^i_{t+1} - r^f_{t+1} = \alpha_t + \lambda_1\mu^i_t + \lambda_2\beta^{1i}_t + \lambda_3\beta^{6i}_t + \varphi_1 SIZE_t + \varphi_2 MOM_t \tag{3.6}$$

$$r^i_{t+1} - r^f_{t+1} = \alpha_t + \lambda_1\mu^i_t + \lambda_2\beta^{1i}_t + \lambda_3\beta^{2i}_t + \lambda_4\beta^{3i}_t + \lambda_5\beta^{4i}_t + \varphi_1 SIZE_t + \varphi_2 MOM_t \tag{3.7}$$

where

$r^i_{t+1} - r^f_{t+1}$ = Excess return

r^f_{t+1} = Risk free rate (Monthly T-bill rate is used as risk free rate)

3.8.6 Panel Regression with Fixed Effects

LCAPM specifications discussed in equations (3.1) to (3.7) have been tested through Panel regression with fixed effect. Housman test has been applied for applying fixed Panel regression. The main reason for the selection of Panel regression over Fama Macbeth (1973) cross sectional regression is the avoidance of statistical biases. Fama Macbeth (1973) cross sectional regression does not measure serial

correlation. It only measures cross-sectional correlations. To measure serial as well as cross sectional correlation Panel regression suggested by Petersen (2009) employed in the research during 2005-2015.Fixed effect shows that selected stocks in the index have their own intercept and these stocks are different from one another

Chapter 4

Data Analysis and Discussion

The chapter illustrates the descriptive statistics of illiquidity measures and stock returns of each country. Correlation among illiquidity measures, innovation in illiquidity measures, Market illiquidity, portfolio betas analysis and Panel regression results of LCAPM specification for each illiquidity measure in each Asian market has been described below.

4.1 Statistical Analysis of Pakistan

4.1.1 Descriptive Statistics of Stock Returns and Illiquidity Proxies

Table 4.1 illustrates the descriptive statistics including mean, median, skewness and kurtosis of monthly equity returns and illiquidity proxies.

The average return of equity during the whole sample period is 0.25% and maximum return is 38% that indicates equity market is highly volatile in nature.

Illiquidity proxies that measure the price impact feature of illiquidity are Amihud Measure, Amivest liquidity, Hui-Heubel liquidity ratio, Market Efficiency Coefficient and Zero Return.

Amihud Ratio has maximum value 9.69 and Amivest liquidity has lowest value 0.03. These two ratios indicate illiquidity in Pakistan stock exchange. Similarly

the huge gap exist between minimum and maximum value (0.0001-9.65) of Hui-Heubel liquidity ratio that also demonstrates low liquidity in the financial market during the sample period July 2005-June 2015. The maximum value of Market efficiency coefficient is very far away from one that also shows illiquidity trend in the emerging market of Pakistan. Zero return another price impact measure shows highest deviation in its maximum value from its minimum value that indicates upward spikes in illiquidity in that financial market. On the other hand minimum value of Amihud ratio is zero. The Amivest liquidity has highest value 0.92. Similarly lower value of zero return is zero and MEC is 0.0007. These ratios also indicate the traces of liquidity in the financial market.

Turnover Ratio and Value turnover are the proxies for measuring depth and breadth of illiquidity in the market. The average value of shares traded in the financial market during the sample period is 0.18 billion. Maximum value of turnover ratio is 1.5%. Low turnover indicates lower liquidity and few numbers of shares traded in the financial market during July 2005-June 2015.

Roll Estimator measures the implicit transaction cost feature of illiquidity. Average value of Roll estimator in the stock market is 0.98 and maximum value is 3.35. It shows variance in change in prices of equities is high that depicts illiquidity in financial market.

The standard deviation in the context of Amihud Ratio, Hui-hebel liquidity ratio, zero return is greater as compared to mean. It indicates risk of loss due to illiquidity is more in the financial market of Pakistan in the context of Amihud Ratio, Hui-Heubel liquidity ratio and zero return as compared to other illiquidity measures. This indicates that illiquidity in Pakistan stock market is sensitive to illiquidity measures used in the study.

All liquidity measures show positive skewness and leptokurtic distribution indicating asymmetry in data distribution and volatility exist due to probability of extreme values during the sample period. Data distribution is rightly skewed and most values are concentrated around the left of mean. Skewness and kurtosis are beyond acceptable range in the data because time series data are usually non-normal and show excess kurtosis with fat tails.

TABLE 4.1: Descriptive Statistics of Illiquidity Proxies and Equity Returns

Variables	Amihud Measure (AM)	Amivest Liquidity (AL)	Hui-Heubel Liquidity Ratio (HHLR)	Market Efficiency Coefficient (MEC)	Zero Return (ZR)	Roll Estimator (RE)	Turnover Ratio (TR)	Value Turnover (VT)	Stock Returns (R_i)
Mean	1.4762	0.2926	1.597125	0.0542	0.0499	0.9888	0.0045	0.1831	0.0025
Median	0.1134	0.2774	0.87349	0.0461	0.0136	0.8200	0.0034	0.1371	0.0061
Maximum	9.6990	0.9235	9.6590	0.1791	0.9667	3.3590	0.0151	0.7171	0.3854
Minimum	0.0000	0.0372	0.0001	0.0007	0.0000	0.0000	0.0004	0.0252	-0.4480
Std. Dev.	9.6150	0.1385	9.6861	0.0336	0.1475	0.6467	0.0034	0.1510	0.1022
Skewness	9.4235	1.0387	4.4290	1.5917	5.2715	1.5741	1.4908	1.6347	-0.5091
Kurtosis	30.3689	5.9305	27.9782	5.6908	30.5031	5.6843	4.5123	5.1889	6.9339
Observations	6000	6000	6000	6000	6000	6000	6000	6000	6000

4.1.2 Correlation Matrix between Illiquidity Proxies

Table: 4.2, demonstrates the relationship between illiquidity proxies covering time period started from July 2005-June 2015. Amihud Measure is negatively related to Amivest liquidity, and Hui-Heubel liquidity Ratio. The possible reason for this is Amihud measure shows the effect of change in price movement in the context of per unit trading volume whereas Amivest liquidity investigates the relationship between trading volume and return. There is negative association between turnover ratio and zero return. High turnover shows large numbers of shares are traded in the financial markets that lead to less zero return days (Lee, 2006). There is positive

association between Hui-Heubel liquidity ratio and market efficiency coefficient. The frequent price movement converts short term volatility in to long term volatility in the financial market (Bhattacharya et al., 2016). The common observation between spread and turnover is negative. The data shows positive association between Roll estimator and turn over. This is confusing or puzzling one because generally it is rare to have a positive relationship between Roll estimator and turnover. Empirical literature of finance including (Barinov, 2014) indicates that usually in emerging market high turnover stocks are uncertain in nature and market maker usually broaden the spread to compensate the losses during informed trading of uncertain stocks. Value turnover and turnover ratio is highly correlated therefore value turnover has been dropped from the study.

TABLE 4.2: Correlation Matrix of Illiquidity Proxies

Variables	**Amihud Measure (AM)**	**Amivest Liquidity (AL)**	**Hui-Heubel Liquidity Ratio (HHLR)**	**Market Efficiency Coefficient (MEC)**	**Zero Return (ZR)**	**Roll Estimator (RE)**	**Turnover Ratio (TR)**	**Value Turnover (VT)**
Amihud Measure (AM)	1	-0.2272	-0.0211	0.0442	-0.1275	0.2653	-0.1077	-0.1172
Amivest Liquidity (AL)	-0.2272	1	-0.4558	-0.0273	0.2353	-0.3008	0.4984	0.5449
Hui-Heubel Liquidity Ratio (HHLR)	-0.0211	-0.4558	1	0.0349	-0.1443	0.2191	-0.1837	-0.2384
Market Efficiency Coefficient (MEC)	0.0442	-0.0273	0.0349	1	0.0558	-0.1675	-0.0615	0.0319
Zero Return (ZR)	-0.1275	0.2353	-0.1443	0.0558	1	0.0522	0.3616	0.3649
Roll Estimator (RE)	0.2653	-0.3008	0.2191	-0.1675	0.0522	1	-0.1569	-0.1121
Turnover Ratio (TR)	-0.1077	0.4984	-0.1837	-0.0615	0.3616	-0.1569	1	0.8944
Value Turnover (VT)	-0.1172	0.5449	-0.2384	0.0319	0.3649	-0.1121	0.8944	1

4.1.3 Innovations in Illiquidity Measures

Innovations in aggregate illiquidity are the time series plots of innovation in stock illiquidity measures including Amihud measure, Amivest liquidity, Hui-Heubel Lliquidity ratio, Market efficiency coefficient, Zero return, Roll estimator and turnover ratio.Market aggregate illiquidity is computed as the equally weighted average of residuals of stock illiquidity measures. Time series plots of innovation in each illiquidity ratio are given below.These graphs show the general trend of illiquidity cost during time frame 2005-2015 in Pakistan stock market. A huge spike in illiquidity cost has been seen in the context of Amihud ratio and zero return during 2008 as compared to later years. The remaining illiquidity cost measures have shown variations during the whole sample period.

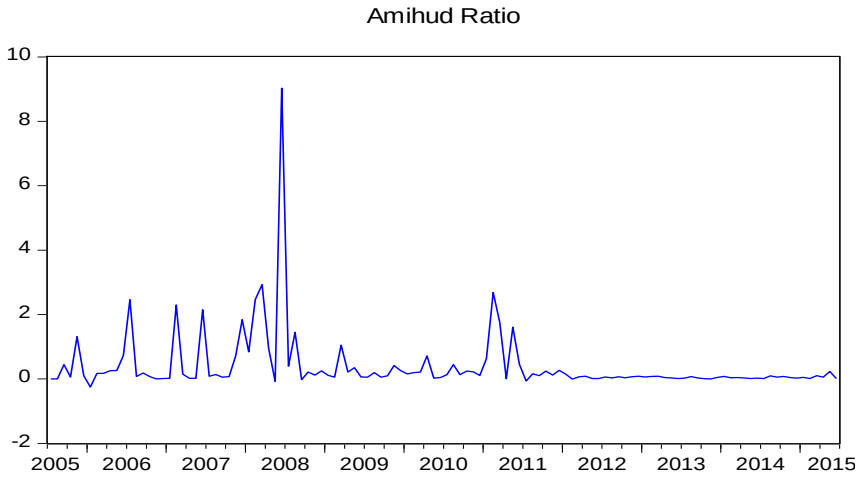

FIGURE 4.1: Innovation in Amihud Ratio.

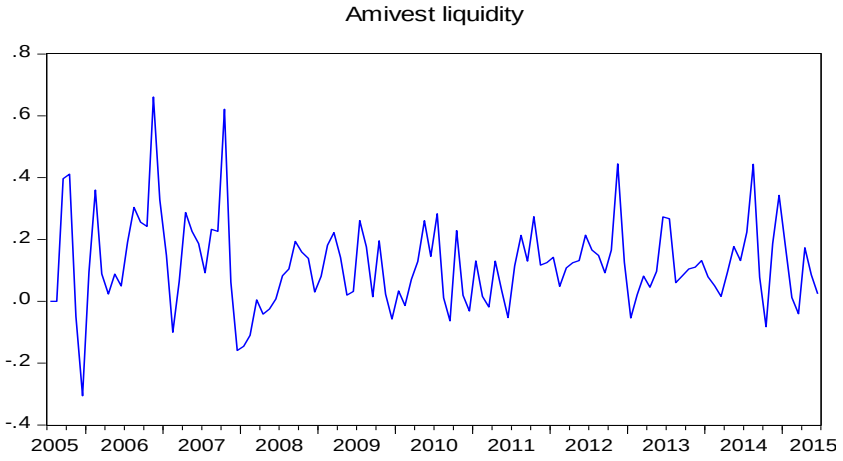

FIGURE 4.2: Innovations in Amivest Liquidity.

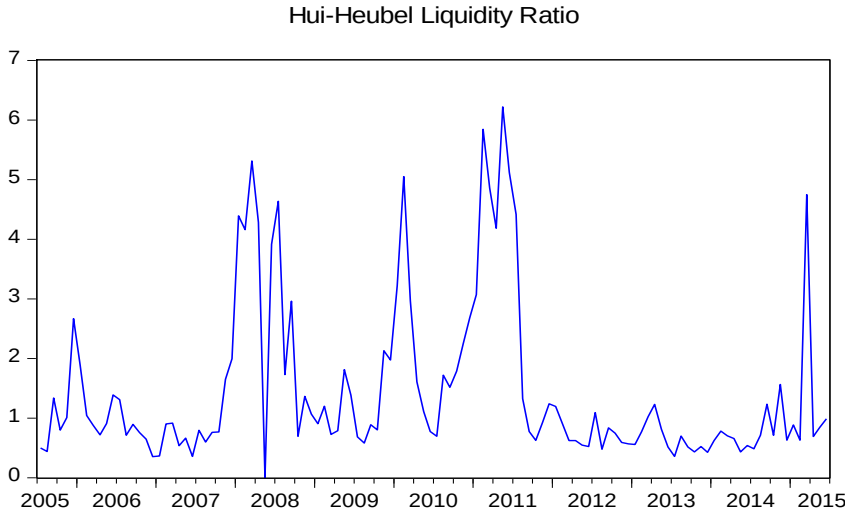

FIGURE 4.3: Innovation in Hui-Heubel liquidity Ratio.

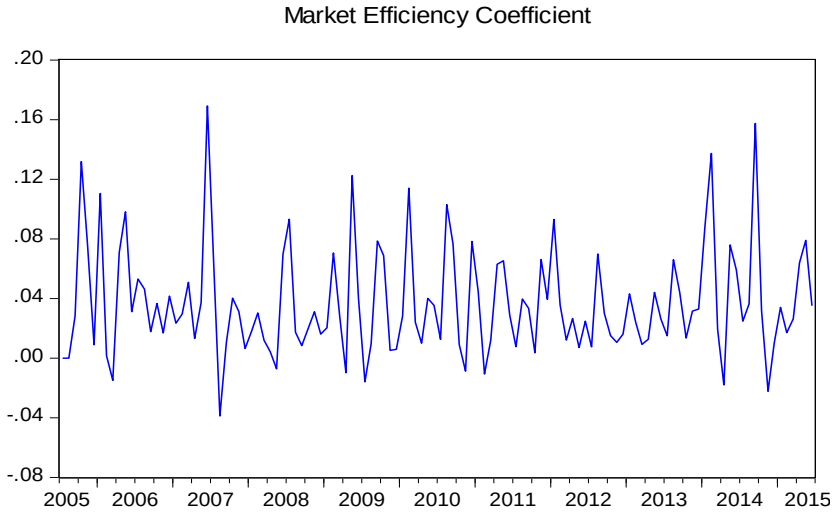

FIGURE 4.4: Innovations in Market Efficiency Coefficient.

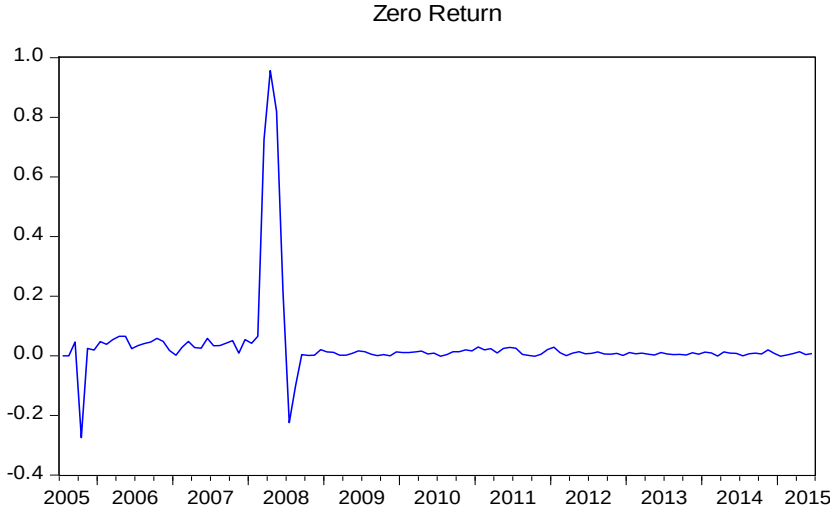

FIGURE 4.5: Innovations in Zero Return.

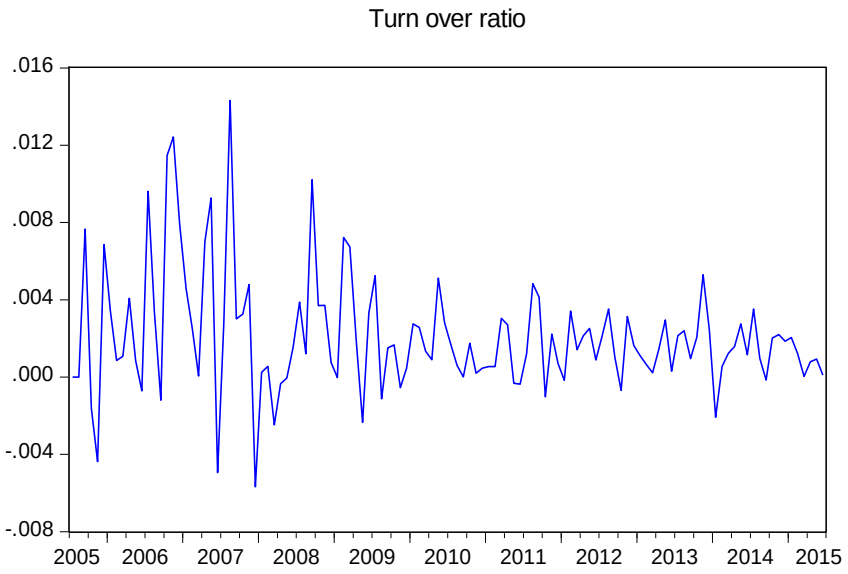

FIGURE 4.6: Innovations in Turnover Ratio.

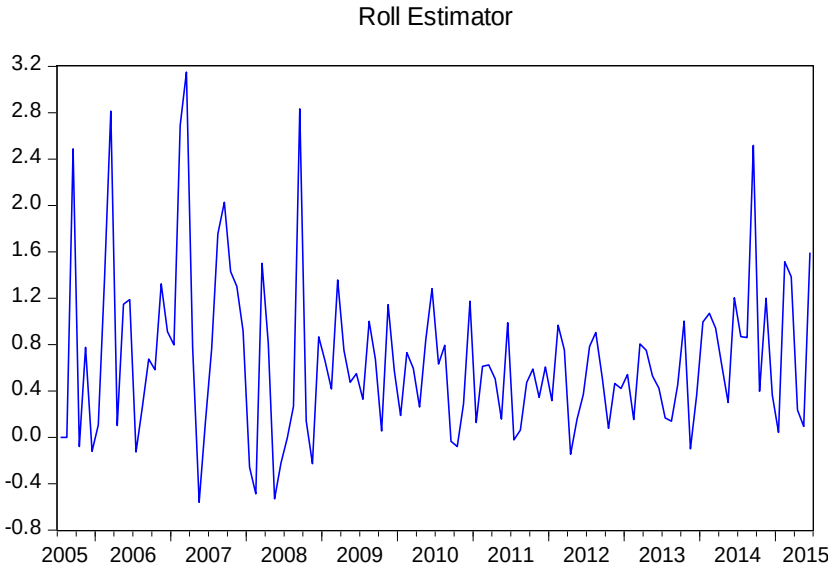

FIGURE 4.7: Innovations in Roll Estimator.

4.1.4 Market Liquidity

Market liquidity derived by computing the equally weighted sum of each illiquidity ratios of all the stocks included in the index of Pakistan stock exchange during time frame July 2005-June 2015. Liquidity ratios include Amihud measure, Amivest liquidity, Hui-Heubel Liquidity Ratio (HHLR), Market Efficiency Coefficient (MEC), Zero Return (ZR), Turnover Ratio (TR) and Roll Estimator

(RE). In 2008 an obvious hump exists due to floor rule in financial crises (Sharif, 2015). As a result of this rule Pakistan stock market has been shut down and this event also support in excluding Pakistan stock market from emerging market index. In 2007 upper spikes in market illiquidity is due to global crises. Figure also shows the condition of market illiquidity improves in later periods. Now Pakistan[1] has been declared a successful hidden frontier market having raise in growth rate of 16% during last 12 months.

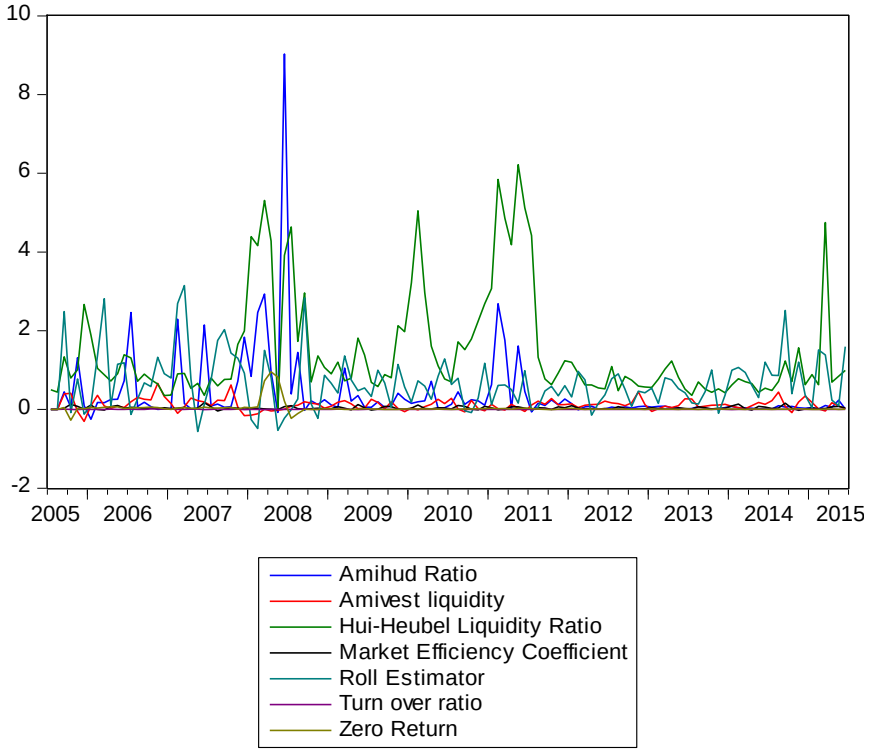

FIGURE 4.8: Market liquidity.

4.1.5 Betas for Decile Portfolios

According to Lee (2011), Kim and Lee (2014) and Vu et al.(2015) Portfolios are sorted on the bases of each illiquidity ratio from lowest to highest illiquidity level. Amihud Measure, Amivest liquidity, Hui-Heubel Liquidity Ratio, Market Efficiency coefficient, Zero return measure the price impact illiquidity. Price depth feature of illiquidity is determined by Turnover rate. Roll estimator is used to

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

measure the implicit transaction cost characteristic of illiquidity in emerging markets.

The study estimates average betas for each portfolio designed on the basis of each illiquidity ratio and reports the results in table 4.3. Mixed results are observed in all the betas showing increasing or decreasing trends in decile portfolios sorted from lowest to highest level of illiquidity. There is no magnificent increasing or decreasing trend is observed in all the betas. All Price impact measures except Amivest liquidity of illiquidity indicate negative sign of β_3 and β_4 supporting LCAPM theory proposed by Acharya and Pedersen (2005) in Pakistan stock exchange during 2005-2015. The results of the study are in line with Kim and lee (2014), Vu et al., (2015) and Hongxing & Duduchoge (2017). Commonality beta β_2 is positive at portfolio level of each illiquidity ratio except Hui-Heubel Liquidity Ratio indicating the co movement of stock illiquidity and market illiquidity in Pakistan stock exchange.

Aggregate liquidity risk and total systematic risk β_5 and β_6 are positive in most of illiquidity cases at portfolio level indicating illiquidity risk is less than market risk. On the other hand negative β_5 and β_6 have also been observed during 2005-2015. Both trends have been observed in the studies of Lee (2011).

TABLE 4.3: Portfolio Betas for illiquidity

	Panel A Amihud Ratio					
Portfolio	β_1	β_2	β_3	β_4	β_5	β_6
(Lowest) 1	0.0300	0.0161	-0.0171	-0.0012	0.0344	0.0643
2	0.0389	0.0019	-0.0155	-0.0001	0.0174	0.0563
3	0.0279	0.0852	-0.0267	-0.0001	0.1119	0.1398
4	0.0391	0.2224	-0.0301	-0.0012	0.2538	0.2929
5	0.0389	0.0233	-0.0193	-0.0047	0.0473	0.0862
6	0.0455	0.0004	-0.0304	-0.0006	0.0314	0.0769
7	0.0392	0.0612	-0.0298	-0.0020	0.0930	0.1323
8	0.0454	0.0255	-0.0220	-0.0023	0.0498	0.0952
9	0.0440	0.2265	-0.0213	-0.0013	0.2491	0.2931

(Highest) 10	0.0539	0.2303	-0.0274	-0.0106	0.2684	0.3222
			Panel B Amivest Liquidity			
Portfolio	β_1	β_2	β_3	β_4	β_5	β_6
(Lowest) 1	0.3432	2.7996	0.1801	0.8984	1.7211	2.0642
2	0.4001	1.9604	0.1977	0.5644	1.1983	1.5984
3	0.4573	1.4394	0.1587	0.2771	1.0037	1.4611
4	0.4151	1.3405	0.1820	0.1829	0.9757	1.3908
5	0.3898	0.8867	0.1582	0.0875	0.6410	1.0308
6	0.5250	0.4554	0.3621	0.0837	0.0096	0.5346
7	0.4473	0.0425	0.2089	0.0321	-0.1985	0.2488
8	0.4494	0.0338	0.0471	0.4965	0.5619	1.0113
9	0.4424	0.1769	0.2377	0.0276	-0.0883	0.3541
(Highest) 10	0.4791	0.4944	0.2419	0.0580	0.1945	0.6736
			Panel C Hui-Heubel Liquidity			
Portfolio	β_1	β_2	β_3	β_4	β_5	β_6
(Lowest) 1	-2.1624	-1.7142	-1.7089	-2.1692	2.1639	0.0016
2	-2.1347	-3.5295	-3.5184	-2.1415	2.1304	-0.0043
3	-2.0174	-0.4550	-0.4535	-2.0242	2.0226	0.0053
4	-2.0450	-4.3809	-4.3668	-2.0518	2.0378	-0.0072
5	-1.2919	-1.1332	-1.1275	-1.2987	1.2930	0.0011
6	-1.9965	-0.3820	-0.3806	-2.0033	2.0018	0.0054
7	-1.6466	-0.3464	-0.3448	-1.6534	1.6518	0.0052
8	-1.7490	-6.6881	-6.6630	-1.7558	1.7307	-0.0183
9	-0.2688	-0.0434	-0.0431	-0.2755	0.2752	0.0065
(Highest) 10	-1.3455	-0.2095	-0.2076	-1.3522	1.3504	0.0049
			Panel D Market Efficiency Coefficient			
Portfolio	β_1	β_2	β_3	β_4	β_5	β_6
(Lowest) 1	0.8175	0.1462	-0.0209	-0.1507	0.3178	1.1353
2	0.7809	0.2310	-0.0448	-0.0162	0.2920	1.0730
3	0.7003	0.2108	-0.0407	-0.0570	0.3085	1.0088
4	0.6033	0.1880	-0.0435	-0.0498	0.2814	0.8847

5	0.8069	0.1113	-0.0176	0.0125	0.1165	0.9233
6	0.5857	0.1402	-0.0413	-0.0786	0.2601	0.8458
7	0.7322	0.2219	-0.0480	-0.0982	0.3682	1.1003
8	0.7370	0.1557	-0.0888	-0.0371	0.2816	1.0186
9	0.7353	0.1761	-0.0688	0.0059	0.2389	0.9742
(Highest) 10	0.6988	0.1474	-0.0329	0.0080	0.1723	0.8712
			Panel E Zero Return			
Portfolio	β_1	β_2	β_3	β_4	β_5	β_6
(Lowest) 1	0.7582	0.2858	-0.0557	0.0010	0.3405	1.0986
2	0.7637	0.3032	-0.0115	-0.0469	0.3616	1.1254
3	0.4841	0.2904	-0.0309	-0.0445	0.3658	0.8498
4	0.4381	0.2945	-0.0136	-0.0424	0.3505	0.7886
5	0.5833	0.2689	-0.0340	-0.0196	0.3225	0.9058
6	0.5442	0.2948	-0.0461	-0.0379	0.3788	0.9231
7	0.5686	0.2783	-0.0353	-0.0363	0.3499	0.9185
8	0.5897	0.2839	-0.0519	-0.0536	0.3894	0.9791
9	0.6052	0.2825	-0.0196	0.0105	0.2916	0.8968
(Highest) 10	0.5632	0.3190	-0.0373	-0.0521	0.4085	0.9717
			Panel F Turnover			
Portfolio	β_1	β_2	β_3	β_4	β_5	β_6
(Lowest) 1	1.3199	0.0032	0.0147	0.0337	-0.0452	1.2747
2	1.0830	0.0020	0.0153	0.0234	-0.0367	1.0463
3	1.0476	0.0015	0.0115	0.0096	-0.0196	1.0280
4	1.0001	0.0011	0.0134	0.0144	-0.0267	0.9735
5	0.8724	0.0007	0.0112	0.0053	-0.0159	0.8566
6	0.9977	0.0007	0.0168	0.0109	-0.0271	0.9706
7	1.0453	0.0005	0.0169	0.0094	-0.0258	1.0195
8	0.8364	0.0002	0.0082	0.0047	-0.0126	0.8238
9	0.5431	0.0001	0.0024	0.0021	-0.0045	0.5386
(Highest) 10	0.9162	0.0000	0.0094	0.0005	-0.0099	0.9063

Panel G Roll Estimator						
Portfolio	$\beta 1$	$\beta 2$	$\beta 3$	$\beta 4$	$\beta 5$	$\beta 6$
(Lowest) 1	0.0234	-0.0278	0.0313	0.0338	-0.0929	-0.0695
2	0.0256	0.7157	0.0047	0.0681	0.6429	0.6685
3	0.0226	0.7078	0.0223	0.0039	0.6816	0.7042
4	0.0179	0.595	0.012	0.0062	0.5769	0.5948
5	0.0222	0.5252	0.0134	0.0139	0.4979	0.52
6	0.0187	0.0691	-0.003	-0.0216	0.0936	0.1123
7	0.0185	0.5496	0.0121	-0.007	0.5445	0.563
8	0.0224	0.7341	-0.0168	0.0023	0.7485	0.7709
9	0.019	1.2769	-0.0001	0.0275	1.2495	1.2685
(Highest)10	0.0202	3.8582	0.006	0.0675	3.7847	3.8049

4.1.6 Results of Liquidity Adjusted Capital Asset Pricing Model for Pakistan

LCAPM specifications have been tested through Panel regressions. The results of Panel regression employed for each illiquidity measure are illustrated below.

4.1.6.1 Liquidity Adjusted Capital Asset Pricing Model Based on Amihud Ratio

Table 4.4 reports the Panel regression results of Amihud ratio. Model 1 to model 7 according to equations (2.9) to (2.15) are presented in columns (1) to (7). Excess return is dependent variable in all the models. β_1 to β_4 represent liquidity risks computed on the basis of equations (2.1) to (2.4). β_5 is the combined illiquidity risk derived according to equation (2.5). β_6 computed in equation (2.6) represent total systematic risk. Firm size and momentum are the control variables during July 2005-June 2015. T-statistics for each coefficient are given in parenthesis. Residual of Amihud Ratio is shown as E_c. E_c is statistically negative significant indicating unforeseen illiquidity exist in Pakistan capital market (Amihud 2002).

β_1 is statistically significant at 10% and 5% significance level in 1st, 5th and 7th models but it is negatively related to excess returns. β_2 the commonality beta is negative but statistically significant at 5% level in 7th model.

The reverse sign of β_1 and β_2 shows that firms performance in Pakistan Stock Exchange is poor and potential investors are reluctant to invest in equities. Moreover investor players hold the securities that lead to put the downward pressure in the prices of equities and in result equity return will fall (Amihud, 2002; Pastor and Stambough, 2003; Jones 2002).

β_3 and β_4 are insignificant in 3rd and 4th model but statistically significant in 7th model at 1% significance level. The result shows that liquidity betas at individual level are insignificant but collectively show significant effect on returns in Pakistan stock exchange during July 2005-June 2015. The negative statistically significant coefficients of β_1, β_2, β_3 and β_4 in model 7 represents that betas affect the returns simultaneously.

β_5 and β_6 are statistically negative significant at 10% level of significance after controlling size and momentum. Combined liquidity risk (β_5) and aggregate systematic risk (β_6) effect the return negatively. The results of the study are in contrast with Acharya and Pedersen (2005), Lee (2011) and Vu et al., (2015).

The studies empirically proved positive relationship among equity return β_5 and β_6 in developed markets. Negative statistically significance of β_5 and β_6 indicates that illiquidity risk in Pakistan stock market is more as compared to market risk. The contrasting result may be asymmetry in information and absence of transparency in financial market affairs. Moreover Pakistan stock exchange comparative to developed countries including New York stock exchange, London stock exchange is not well advanced.

Negatively statistically significant coefficient of momentum supports poor performance of stock during 2005-2015. Moreover firm size is also statistically positive significant indicating the effect of market capitalization on return is also weak during the sample period.

Adjusted R^2 is just 0.05 in all LCAPM specifications. It means that contribution of amihud ratio for pricing of illiquidity risk individually and collectively is less in stock market of Pakistan during the sample framework of the study. F –statistics is significant, therefore model is good fit to data.

TABLE 4.4: Results of LCAPM Based on Amihud Ratio

	Models						
Variable	1	2	3	4	5	6	7
Constant	-0.917***	-0.912***	-0.996***	-0.914***	-1.00***	-0.955***	-0.728***
	(-4.08)	(-3.94)	(-3.46)	(-3.08)	(-3.44)	(-4.04)	(-2.42)
E_c	-0.251***	-0.251***	-0.254***	-0.251***	-0.255***	-0.252***	-0.232***
	(-4.87)	(-4.86)	(-4.87)	(-4.78)	(-4.87)	(-4.90)	(-4.42)
$\beta 1$	-0.043*	-0.055	-0.027	-0.044	-0.042*		-0.371***
	(-1.75)	(-0.40)	(-0.62)	(-1.06)	(-1.67)		(-2.23)
$\beta 2$		-0.076					-3.076***
		(-0.09)					(-2.40)
$\beta 3$			0.101				5.868***
			(-0.44)				(-3.47)
$\beta 4$				-0.044			-5.626***
				(-0.02)			(-3.42)
$\beta 5$					-0.111*		
					(-1.88)		
$\beta 6$						-0.043*	
						(-1.79)	
Firm Size	0.038***	0.038***	0.042***	0.038***	0.043***	0.040***	0.043***
	-4.13	-4.11	-3.48	-3.09	-3.32	-4.08	-3.19
Momentum	-0.036***	-0.036***	-0.036***	-0.035***	-0.036***	-0.036***	-0.026***
	(-3.19)	(-3.18)	(-3.22)	(-3.15)	(-3.23)	(-3.22)	(-2.24)
F-statistics	4.42	4.1	4.11	4.1	4.11	4.43	4.39
F –statistics(p)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Adjusted R^2	0.05	0.05	0.05	0.05	0.05	0.05	0.07

*E_c (liquidity level), β_1 (market risk), β_2 (Commonality beta), β_3 (Flight to liquidity beta), β_4 (Depressed wealth beta), β_5 (Aggregate liquidity beta), β_6 (Systematic risk). * indicate 10% level of significance, ** indicate 5% level of significance and *** indicate 1% level of significance*

4.1.6.2 Liquidity Adjusted Asset Pricing Model Based on Amivest Liquidity

Results of seven LCAPM specifications are reported in table 4.5 on the basis of Amivest liquidity. Coefficient of liquidity cost (E_c) is positive and statistically significant that support the relationship between illiquidity and return.

β_1 is statistically significant in all models at 5%, 1% and 10% level of significance except third and fourth models. The positive coefficient of β_1 demonstrates market risk exist in Pakistan stock exchange.

At first individual liquidity betas β_2, β_3 and β_4 are discussed. β_2 the commonality beta is statistically significant at 10% level of significance. Negative coefficient depicts the effect of co movement between stock illiquidity and market illiquidity on return is negative. Investors are reluctant to invest in equities and usually hold the securities due to poor performance of stocks in Pakistan Stock exchange during the sample covering the time period starting from July 2005-June 2015.

β_5 and β_6 aggregate liquidity betas are statistically negative significant at 5% and 1% significance level. According to Amihud (2002) the negative sign of illiquidity betas show the traces of existence of unexpected illiquidity in financial market. Market players are not capable to judge the illiquidity premium correctly. A sudden illiquidity in the market leads the investors to expect higher illiquidity in future time period. Therefore investors pay less for such securities that will fall the contemporaneous returns.

The unexpected situation of illiquidity increases the illiquidity risk more as compared to market risk in financial markets. Acharya and Pedersen (2005) also support fall in return due to unexpected illiquidity in financial market. Few studies including (Marcelo & Quirós; 2006, Martinez, Nieto, Rubio, & Tapia; 2005 and Florackis et al., 2011) report the same findings. The findings of the research support the 5th and 6th hypothesis that aggregate systematic risk and combined liquidity risk exist in Pakistan financial market during 2005-2015.

Findings show firm size is statistically insignificant and positively significant in models (1) to (7). It means firm size does not overwhelm the effect of liquidity

in Pakistan stock exchange. Momentum is found to be statistically significant indicating the effect of momentum exists in Pakistan stock exchange during the sample period.

TABLE 4.5: Results of LCAPM Based on Amivest Liquidity

	Models						
Variable	1	2	3	4	5	6	7
Constant	-0.156	-0.111	-0.084	-0.155	-0.637	-0.841	-2.358***
	(-0.74)	(-0.52)	-0.7	(-0.68)	(-2.46)	(-4.11)	(-7.31)
E_c	0.070***	0.073***	0.072***	0.070***	0.060***	0.064***	0.004
	-3.55	-3.7	-3.65	-3.5	-3.08	-3.25	-0.18
$\beta 1$	0.036**	0.051***	0.018	0.036	0.265***		0.876***
	-2.27	-2.81	-0.84	-0.04	-3.58		-8.78
$\beta 2$		-0.045*					-0.978***
		(-1.75)					(-8.70)
$\beta 3$			-0.055				-0.447
			(-1.22)				(-4.04)
$\beta 4$				-0.001			2.273
				(-0.02)			-9.08
$\beta 5$					-0.244***		
					(-3.16)		
$\beta 6$						-0.272***	
						(-3.67)	
Firm Size	0.007	0.007	0.004	0.007	0.036***	0.046***	0.136***
	-0.78	-0.81	-0.43	-0.73	-2.87	-4.35	-8.11
Momentum	0.052***	0.057***	0.056***	0.052***	0.047***	0.049***	0.066***
	-4.99	-5.28	-5.12	-4.81	-4.48	-4.78	-6.26
F-statistics	6.73	6.49	6.36	6.24	7.04	7.45	11.52
F –statistics(p)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Adjusted R^2	0.09	0.09	0.09	0.1	0.1	0.1	0.18

*E_c (liquidity level), β_1 (market risk), β_2 (Commonality beta), β_3 (Flight to liquidity beta), β_4 (Depressed wealth beta), β_5 (Aggregate liquidity beta), β_6 (Systematic risk). * indicate 10% level of significance, ** indicate 5% level of significance and *** indicate 1% level of significance.*

4.1.6.3 Liquidity Adjusted Asset Pricing Model Based on Hui- Heubel Liquidity Ratio

Table 4.6 shows the panel regression results of Hui-Heubel illiquidity ratio after controlling firm size, momentum illiquidity cost and market risk. The illiquidity cost E_c is negative and statistically significant at 1% significance level. The higher volatility in price movement due to illiquidity shocks leads to higher execution cost that leads to lower returns (Wyart et al., 2008).

β_1 is statistically insignificant in all models except 4th, indicating that aggregate shocks in Hui-Heubel liquidity ratio has not been priced in Pakistan stock exchange.

β_2, β_3 are statistically insignificant if these are analyzed individually indicating commonality beta and flight to liquidity beta are not priced in the context of Hui Heubel liquidity Ratio. So the study could not accept the first and second hypotheses. Investors are not compensated if they take liquidity commonality risk and flight to liquidity risk in the stock market of Pakistan in the context of Hui-Heubel liquidity ratio. This shows that pricing of liquidity risk is sensitive to illiquidity proxies used in the research.

β_4 is statistically significant with negative sign at 1% significance level supporting third hypothesis of study that liquidity sensitivity to stock returns exist in Pakistan stock exchange.

β_5 is statistically insignificant with respect to hui heubel liquidity ratio. Hence aggregate liquidity risk due to hui heubel liquidity ratio does not price in Pakistan financial market. Aggregate systematic risk is statistically significant at 1% level of significance demonstrating aggregate systematic risk has been priced in Pakistan financial market.

Significant positive coefficients of firm size indicate that firm size anomaly in the context of Hui-Heubel liquidity ratio has not been observed in Pakistan stock market during sample period. The momentum effect is negative but significant in stock market of Pakistan. Adjusted R2 is 10 percent at individual level. It

demonstrates that the contribution of short term volatility in the pricing of liquidity commonality, flight to liquidity and depressed wealth effect of liquidity is less. Similarly adjusted R2 is also less in sixth and seventh LCAPM specidfications.

TABLE 4.6: Results of LCAPM Based on Hui-Heubel Liquidity Ratio

	Models						
Variable	1	2	3	4	5	6	7
Constant	-0.526	-0.527	-0.545	-0.734	-0.527	-0.374	-0.769
	(-2.13)	(-2.12)	(-2.19)	(-2.82)	(-2.12)	(-2.03)	(-2.93)
E_c	-0.015***	-0.015***	-0.014***	-0.012***	-0.015***	-0.014***	-0.012***
	(-7.71)	(-6.82)	(-5.86)	(-4.66)	(-7.71)	(-7.82)	(-4.79)
$\beta 1$	0	0	0	0.002**			0.002***
	(-1.20)	(-0.18)	(-0.69)	-2.51			-2.63
$\beta 2$		0					0
		(-0.19)					(-1.12)
$\beta 3$			0				-0.011
			0.68				(-0.67)
$\beta 4$				-0.002***			-0.002***
				(-2.51)			(-2.74)
$\beta 5$					0.001		
					-1.12		
$\beta 6$						-0.093***	
						(-2.34)	
Firm Size	0.023***	0.023***	0.024***	0.031***	0.023***	0.017***	0.033***
	-2.24	-2.24	-2.3	-2.92	-2.24	-2.18	-3.04
Momentum	-0.049***	-0.049***	-0.050***	-0.050***	-0.049***	-0.045***	-0.048***
	(-4.23)	(-4.32)	(-4.49)	(-4.53)	(-4.44)	(-4.18)	(-4.23)
F-statistics	6.99	6.89	6.92	7.4	7.42	7.78	6.99
F –statistics(p)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Adjusted R^2	0.1	0.1	0.1	0.11	0.1	0.11	0.11

E_c (liquidity level), β_1 (market risk), β_2 (Commonality beta), β_3 (Flight to liquidity beta), β_4 (Depressed wealth beta), β_5 (Aggregate liquidity beta), β_6 (Systematic risk).

** indicate 10% level of significance, ** indicate 5% level of significance and *** indicate 1% level of significance.*

4.1.6.4 Liquidity Adjusted Asset Pricing Model Based on Zero Return

Table 4.7 reports the result of panel regressions of zero return. Results shows that E_c has no significant impact on excess return of equities. Equity returns has no relationship with liquidity level E_c. The result of the research is in line with Vu et al (2015). They found the same results of zero return in the Australian stock market. β_1 is statistically significant at 1%, 5% and 10% level of significance in all models except 1. The sign of β_1 is positive as expected.

β_2, the commonality beta is statistically positive significant in first and fifth model at 1% significance level supporting the (Chordia et al. 2000; Hasbrouck and Seppi 2001) that investors want compensation for holding the asset whose liquidity decreases with the decrease in market liquidity in the financial market. The result also accept the first hypothesis that commonality beta is significantly priced in Pakistan stock exchange.

β_3 and β_4 are statistically significant at 1% and 5% level of significance. Negative coefficient of β_4 supports the Acharya and Pedersen (2005) that investors are willing to pay a premium for an equity that remains liquid in poor market conditions in Pakistan stock exchange and support third hypothesis of the research. β_3 that shows the sensitivity of equity return with stock liquidity is also significantly priced in Pakistan stock exchange. The sign of β_3 is positive and contradicts with Pastor and Stambaugh (2003) that investors pay a premium for such stocks that have high return when market is illiquid.

β_5 and β_6 are statistically significant at 1% level of significance. The result of regression 5 shows that liquidity risks are priced in the presence of market risk. The coefficients of β_5 and β_6 are positive that concludes aggregate systematic risk and liquidity risk have positive relationship with the equity returns. The result of the study is in line with the results of the recent study Hongxing and Duduchoge (2017) in Ghana stock exchange.

Regression is run after controlling market risk, liquidity cost, firm size and momentum. Momentum is statistically insignificant indicating no effect of momentum during sample period. Firm size is statistically significant but it has positive sign

therefore anomaly related to firm size that smaller firms have more returns are not observed in Pakistan stock exchange during sample period 2005-2015.

TABLE 4.7: Results of LCAPM Based on Zero Return

	Models						
Variable	1	2	3	4	5	6	7
Constant	-0.689	-0.997	-0.557	-0.73	-1.127	-0.891	-0.997
	(-2.69)	(-3.91)	(-2.17)	(-2.86)	(-4.33)	(-5.25)	(-3.74)
E_c	-0.134	0.007	0.083	0.109	0.006	0.042	0.218
	(-0.42)	-0.02	-0.26	-0.33	-0.02	-0.14	-0.67
$\beta 1$	0.008	0.240***	0.026***	0.018*	0.290***		0.229***
	-0.89	-6.15	-2.01	-1.86	-6.1		-4.2
$\beta 2$		0.270***					0.252***
		-6.1					-4.6
$\beta 3$			0.522				0.055
			(3.65)***				-0.32
$\beta 4$				-0.679			-0.553
				(-2.51)**			(-2.08)**
$\beta 5$					0.301		
					(6.03)***		
$\beta 6$						0.281	
						(5.98)***	
Firm Size	0.028***	0.032***	0.024**	0.030***	0.035***	0.026***	0.032***
	-2.64	-3.06	-2.27	-2.76	-3.35	-3.64	-3.04
Momentum	-0.014	-0.003	-0.019*	-0.01	0.003	0.003	-0.002
	(-1.26)	(-0.29)	(-1.74)	(-0.96)	-0.24	-0.3	(-0.15)
F-statistics	4.33	4.62	2.85	2.33	4.56	4.8	4.33
F –statistics(p)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Adjusted R^2	0.06	0.06	0.06	0.06	0.06	0.06	0.06

E_c (liquidity level), β_1 (market risk), β_2 (Commonality beta), β_3 (Flight to liquidity beta), β_4 (Depressed wealth beta), β_5 (Aggregate liquidity beta), β_6 (Systematic risk).

** indicate 10% level of significance, ** indicate 5% level of significance and *** indicate 1% level of significance.*

4.1.6.5 Liquidity Adjusted Asset Pricing Model Based on Market Efficiency Coefficient

Regressions are run on excess return and liquidity betas (β_2, β_3 and β_4), total liquidity effect (β_5) and total systematic risk (β_6) after controlling market risk (β_1), liquidity level (E_c), firm size and momentum. Liquidity level is found to be statistically positive significant at 1% significance level. Extra cost associated with illiquidity affect the stock returns positively. Market risk is positive and significant. It is priced during sample period in Pakistan stock market.

Liquidity commonality premium, flight to liquidity premium and depressed wealth premium in the context of market efficiency coefficient have not been observed during 2005-2015. Investors are not hedged in this stock market if they replace illiquid asset with liquid asset in the context of market efficiency coefficient. The study could not accept first, second and third hypothesis of the model due to insignificant coefficients of β_2, β_2 and β_2.

β_2, β_3 and β_4 are statistically insignificant when these are discussed at individual level but in model seven all liquidity betas are significant with expected signs and support the LCAPM theory. The results of the study also support Butt and Virk (2015), that at individual level commonality beta is positive but not statistically priced in equity return. Saad and Samet(2015) also reports that flight to liquidity beta does not have any significant impact in explaining the cross section return of equities.

Aggregate liquidity risks and aggregate systematic risks both are statistically significant at 1% level of significance indicating liquidity risks and systematic risks are priced in equities of Pakistan financial markets and accept fourth and fifth hypothesis of research. The controlling variables firm size and momentum is statistically positive significant indicating no size anomaly exists in Pakistan stock market and upward trend of price movement of equity exist due to presence of more short period volatility in Pakistan capital market.

Adjusted R^2 is 10 percent in seven models. The contribution of market efficiency coefficient in bringing variation in stock returns through illiquidity risk is less.

TABLE 4.8: Results of LCAPM Based on Market Efficiency Coefficient

	Models						
Variable	1	2	3	4	5	6	7
Constant	-0.437	-0.409	-0.317	-0.354	-1.277	-1.316	-0.387
	(-2.15)	(-2.00)	(-1.44)	(-1.58)	(-1.75)	(-1.81)	(-0.46)
E_c	0.019***	0.019***	0.018***	0.019***	0.022***	0.024***	0.022***
	-4.81	-4.75	-4.73	-4.75	-5.59	-6.07	-5.59
$\beta 1$	0.010***	0.013***	0.007***	0.008***	0.219***		0.251***
	5.14	4.46	2.49	3.43	4.62		4.36
$\beta 2$		0.006					0.245***
		1.55					4.33
$\beta 3$			0.012				-0.274***
			1.35				-2.83
$\beta 4$				0.008			-0.207***
				1.01			-4.08
$\beta 5$					0.212***		
					4.42		
$\beta 6$						0.263***	
						5.67	
Firm Size	0.019***	0.016*	0.015*	0.016*	0.026***	0.029***	0.026***
	2.34	1.9	1.83	1.86	2.6	3.04	2.63
Momentum	0.056***	0.055***	0.055***	0.055***	0.054***	0.053***	0.054***
	5.45	5.33	5.34	5.38	5.22	5.16	5.24
F-statistics	6.36	6.02	6.05	5.96	6.01	6.42	5.87
F –statistics(p)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Adjusted R	0.1	0.1	0.1	0.1	0.1	0.1	0.1

*E_c (liquidity level), β_1 (market risk), β_2 (Commonality beta), β_3 (Flight to liquidity beta), β_4 (Depressed wealth beta), β_5 (Aggregate liquidity beta), β_6 (Systematic risk). * indicate 10% level of significance, ** indicate 5% level of significance and *** indicate 1% level of significance.*

4.1.6.6 Liquidity Adjusted Asset Pricing Model Based on Turnover

Regression results of turnover; a price depth measuring trait of liquidity is reported in table 4.9. E_c liquidity cost is negatively related to excess return and significant

as well. The negative sign of liquidity cost after controlling market risk, firm size and momentum confirms the inverse relationship between turnover and return. Low turnover ratio indicates less liquidity in Pakistan stock market. β_1 is the market risk and is statistically significant positive during the whole sample periods. This shows that investors are rewarded in Pakistan stock exchange when they take market risk.

β_2 the commonality beta derived through co movement of market liquidity and stock liquidity is statistically significant with positive sign as expected in 1^{st} and 7^{th} models at 1% level of significance. This supports commonality beta priced in Pakistan financial market and support the first hypothesis. Tayah, Bino, Ghunmi and Tayem (2015) provide strong evidence for the existence of commonality beta in emerging market Amman stock exchange.

β_3 and β_4 are significant with positive sign in contradict with the Pastor and Stambaugh (2003) and Acharya and pedersen (2005). According to Fang, Sun and Wang (2006) investors pay premium for that equity that has high return in the market illiquidity condition. Therefore the effect of beta on excess return should be negative. This theory is founded in developed market such as stock market of U.S.A. a fully developed market of the world. LCAPM theory is based upon the features of developed market that are entirely different from emerging markets. In emerging markets contemporaneous stock prices result in response to unexpected market illiquidity but expected illiquidity lead to increase the return. The intuition behind that fact is expected illiquidity increases due to higher realized illiquidity that lead to increase the stock expected return. Similarly stock prices are being affected negatively due to increase in unexpected market illiquidity but in the mean while the demand for the liquid stocks relatively increases that mitigates the decline in the prices of stocks. Hongxing and Duduchoge (2017) found positive β_3 and β_4 in emerging market of Ghana.

β_5 and β_6 are statistically significant with negative sign in Pakistan financial market at 1% significance level in fifth and sixth model and support fourth and fifth hypothesis that combined liquidity risk and systematic risk are priced in emerging stock market of Pakistan and favors the LCAPM model proposed by Acharya and

Pedersen (2005). Negative sign indicates liquidity risk is more pronounced in Pakistan as compared to market risk. Firm size is positive and statistically significant showing no size effect in Pakistan stock exchange during the sample period. More over the negative significant coefficients of momentum indicates that momentum effect exist in the financial market of Pakistan. Negative coefficients of momentum also support the negative liquidity level verifying the poor returns of firms in illiquid market conditions.

TABLE 4.9: Results of LCAPM Based on Turnover

	Models						
Variable	1	2	3	4	5	6	7
Constant	-0.221	-0.24	-0.246	-0.248	-0.247	-0.185	-0.194
	(-4.04)	(-11.69)	(-12.34)	(-11.40)	(-11.92)	(-12.46)	(-7.35)
E_c	-0.348**	-0.348***	-0.384***	-0.381***	-0.384***	-0.314***	-0.335***
	(-3.93)	(-3.96)	(-4.34)	(-4.26)	(-3.96)	(-3.55)	(-3.75)
$\beta 1$	0.058***	0.055***	0.071***	0.071***	0.072***		0.038**
	-4.34	-4.04	-5.08	-4.92	-5.03		-2.24
$\beta 2$		0.038**					0.86
		-2.07					-1.4
$\beta 3$			0.152***				0.817***
			-3.11				-3.82
$\beta 4$				0.107**			-0.684***
				-2.33			(-3.31)
$\beta 5$					-0.066***		
					(-2.69)		
$\beta 6$						0.029***	
						-2.83	
Firm Size	0.006***	0.007***	0.007***	0.007***	0.007***	0.006***	0.006***
	-12.94	-11.11	-13.36	-10.37	-13.12	-12.27	-8.07
Momentum	-0.036***	-0.047***	-0.034***	-0.032***	-0.033***	-0.035***	-0.041***
	(-3.57)	(-4.67)	(-3.42)	(-3.23)	(-3.29)	(-3.44)	(-4.00)
F-statistics	12.23	15.5	13.26	13.78	13.38	12.89	13.79
F –statistics(p)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Adjusted R	0.16	0.22	0.19	0.2	0.19	0.17	0.22

*E_c (liquidity level), β_1 (market risk), β_2 (Commonality beta), β_3 (Flight to liquidity beta), β_4 (Depressed wealth beta), β_5 (Aggregate liquidity beta), β_6 (Systematic risk). * indicate 10% level of significance, ** indicate 5% level of significance and *** indicate 1% level of significance.*

4.1.6.7 Liquidity Adjusted Asset Pricing Model Based on Roll Estimator

The transaction cost feature of multinational liquidity is encountered through popular low frequency emerging illiquidity indicator Roll estimator. Table 4.10 reports transaction cost has negative influence on equity return. The statistically negative coefficient of E_c indicates high transaction cost lowers the rate of return.

β_1 shows that market risk has been priced in Pakistan financial stock market. The negative significant coefficient of β_1 at 1% significance level indicates illiquid risk is more as compared to market risk. The negative statistically significant coefficient of β_6 also supports more illiquidity risk in Pakistan capital market during the sample period July 2005-June 2015.

β_2 and β_3 are insignificant in Pakistan stock exchange so the study could not accept first and second hypothesis of the model. The findings of the study are in line with Hongxing and Duduchoge (2017), who report insignificant but positive liquid betas in Ghana stock market. β_4 is statistically significant at 10% significance level but with positive sign in contradict with Acharya and Pedersen (2005).

β_5 is significant at 10% significance level indicating systematic risk is significantly priced in Pakistan stock market and investors receive compensation in the form of liquidity risk premium when they hold risky asset.

Firm size is statistically positive significant indicating absence of firm size anomaly. Statistically significant negative coefficients of momentum shows momentum effect exist in Pakistan stock exchange.

Adjusted R^2 is 13 to 15 percent that reflects that variation in explaining the stock returns due to illiquidity risk in the context of Roll Estimator is more as compared to other illiquidity proxies used in the study. It means transaction cost for the

execution of trading of securities has a strong influence on stock returns in Pakistan stock market.

TABLE 4.10: Results of LCAPM Based on Roll Estimator

	Models						
Variable	1	2	3	4	5	6	7
Constant	-1.124	-1.032	-1.314	-1.658	-0.996	-1.032	-1.634
	(-6.68)	(-4.83)	(-5.42)	(-5.00)	(-5.34)	(-5.38)	(-3.41)
E_c	-0.034***	-0.033***	-0.035***	-0.035***	-0.033***	-0.030***	-0.032***
	(-6.95)	(-6.71)	(-7.04)	(-7.08)	(-6.52)	(-5.94)	(-6.49)
$\beta 1$	-2.376***	-2.374***	-2.605***	-0.056***	-2.552***		-4.795***
	(-6.53)	(-6.52)	(-6.20)	(-6.13)	(-6.72)		(-7.37)
$\beta 2$		-0.012					-0.201***
		(-0.70)					(-3.66)
$\beta 3$			0.101				1.119**
			-1.09				-2.02
$\beta 4$				0.23			-0.025
				-1.86			(-0.05)
$\beta 5$					0.004***		
					-2.81		
$\beta 6$						-0.001***	
						(-2.58)	
Firm Size	0.049***	0.046***	0.057***	0.072***	0.046***	0.043***	0.080***
	-7.04	-5.4	-5.64	-5.16	-6.15	-5.69	-4.15
Momentum	-0.020*	-0.019*	-0.020*	-0.02**	-0.019**	-0.014	-0.018
	(-1.83)	(-1.80)	(-1.87)	(-2.07)	(-1.78)	(-1.30)	(-1.50)
F-statistics	9.12	-1.8	8.56	8.75	8.67	5.51	8.94
F –statistics(p)	0	0	0	0	0	0	0
Adjusted R	0.13	0.13	0.13	0.13	0.13	0.07	0.15

*E_c (liquidity level), β_1 (market risk), β_2 (Commonality beta), β_3 (Flight to liquidity beta), β_4 (Depressed wealth beta), β_5 (Aggregate liquidity beta), β_6 (Systematic risk). * indicate 10% level of significance, ** indicate 5% level of significance and *** indicate 1% level of significance.*

4.2 Statistical Analysis of Japan

4.2.1 Descriptive Statistics of Stock Returns and Illiquidity Proxies

Table 4.11 analyzes the behavior of data in Japan during July 2005-June 2015. Average return has been observed in Tokyo stock exchange is .08%. The maximum return in this market is 4.6% during the sample period. Price impact proxies of illiquidity including Amihud ratio, Amivest liquidity, Hui-Heubel liquidity ratio, market efficiency coefficient and zero return show deviations in their maximum and minimum values, indicating the wave of illiquidity in the financial market of Japan. The minimum value of Amihud ratio and Amivest liquidity is 0.0009 and 0.2630 where as highest value of these ratios observed during the sample period is 7.55 and 6.9.

The percentage of volume needed to bring price impact in trading of securities is less in Tokyo stock exchange The maximum value of market efficiency coefficient is 0.1951, very far from 1 showing market is not resilient. The reaction to liquidity shocks is abnormal creating the opportunity of excess returns in Japan stock market.

Turnover ratio has been dropped from 27% to 0.01% during 2005-2015 demonstrating illiquidity in Tokyo stock exchange. Spread measure, Roll estimator highest value is 237.7 during sample period also supports illiquidity in this stock market. The transaction cost for the execution of trading of equities in Japan stock market is high.

The standard deviation of Amihud ratio, Amivest liquidity Hui-Heubel liquidity ratio and Roll Estimator is greater as compared to mean. This shows that risk of loss due to illiquid risk is more in the financial market of Japan. On the other hand the standard deviation of market efficiency coefficient, zero return and turnover is less as compared to mean. It means less risk of loss exist in the context of these illiquid measures in the financial market of Japan. Therefore liquidity risk is sensitive to the measures used in the study.

The distribution is leptokurtic and positive skewness except zero return has been seen in all illiquidity measures during the sample period. The data distribution is rightly skewed that shows most values of data series are concentrated around the left of mean. Excess Kurtosis exists in all illiquidity series. The distribution of illiquidity series contains flat tails. The probability of extreme values exists in the data during sampling framework of 10 years.

TABLE 4.11: Descriptive Statistics of Illiquidity Proxies and Equity Returns.

Variables	**Amihud Measure (AM)**	**Amivest Liquidity (AL)**	**Hui-Heubel Liquidity Ratio (HHLR)**	**Market Efficiency Coefficient (MEC)**	**Zero Return (ZR)**	**Turnover Ratio (TR)**	**Value Turnover (VT)**	**Roll Estimator (RE)**	**Stock Returns (Ri)**
Mean	0.4546	0.8588	0.5045	0.0586	0.0581	0.0282	10.2313	6.5712	0.0008
Median	0.1706	0.5322	0.3427	0.0497	0.0611	0.0245	9.3673	3.6511	0.0015
Maximum	7.5550	6.9009	3.9982	0.1951	0.1139	0.2765	21.8512	237.7132	0.0460
Minimum	0.0009	0.2630	0.0575	0.0086	0.0071	0.0011	2.4520	1.0169	-0.1099
Std. Dev.	0.9178	1.0725	0.5145	0.0333	0.0201	0.0292	3.9773	21.5151	0.0170
Skewness	4.8174	3.9172	3.7276	1.4904	-0.3940	5.3738	0.6595	10.4632	-2.1699
Kurtosis	32.9464	19.4171	22.0182	5.5270	3.8385	44.9710	3.2206	112.8866	16.3849
Observations	7680	7680	7680	7680	7680	7680	7680	7680	7680

4.2.2 Correlation Matrix between Illiquidity Proxies

The correlation among all illiquidity measures is negligible and within tolerable limits (Table 4.12). Amihud measure is negatively related to Amivest liquidity because both ratios measure illiquidity in contrast to each other. Amihud measure shows the effect of change in price due to change in per unit of volume where as Amivest liquidity indicating the effect of change in volume due to change in price. The positive association between market efficiency coefficient and Hui-Heubel liquidity ratio indicates short term price volatility exist in a non-resilient market.Roll estimator is negatively related to turnover ratio that indicates turnover rate is low due to high spread in Tokyo stock exchange during sample period.

TABLE 4.12: Correlation Matrix of Illiquidity Proxies.

Variables	**Amihud Measure (AM)**	**Amivest Liquidity (AL)**	**Hui-Heubel Liquidity Ratio (HHLR)**	**Market Efficiency Coefficient (MEC)**	**Zero Return (ZR)**	**Turnover Ratio (TR)**	**Roll Estimator (RE)**
Amihud Measure (AM)	1	-0.1585	0.3787	-0.1210	0.1468	0.0515	-0.0453
Amivest Liquidity (AL)	-0.1585	1	-0.1761	-0.1159	-0.0833	-0.1863	-0.0594
Hui-Heubel Liquidity Ratio (HHLR)	0.3787	-0.1761	1	0.0810	0.1242	0.1460	0.1417
Market Efficiency Coefficient (MEC)	-0.1210	-0.1159	0.0810	1	0.1060	0.0496	-0.1185
Zero Return (ZR)	0.1468	-0.0833	0.1242	0.1060	1	0.2967	0.0537
Turnover Ratio (TR)	0.0515	-0.1863	0.1460	0.0496	0.2967	1	-0.0472
Roll Estimator (RE)	-0.0453	-0.0594	0.1417	-0.1185	0.0537	-0.0472	1

4.2.3 Innovations in Illiquidity Measures

Innovation in illiquidity measures are shown as time series plots of innovation in each illiquidity ratio. Innovations in Amihud measure, Amivest liquidity, Hui-Heubel liquidity ratio, Market efficiency coefficient and zero return are price impact innovations. Innovations in Turnover ratio are breadth and depth capturing innovations in illiquidity. The implicit transaction innovations in illiquidity are measured through innovations in Roll estimator. The graphs of innovations in illiquidity measures are shown below.The graphs reveal the variations in Amihud ratio, Hui-Heubel liquidity ratio and Roll estimator are less in Tokyo stock exchange. On the other hand, the rest of the illiquidity proxies have variations during the whole time frame of the study.

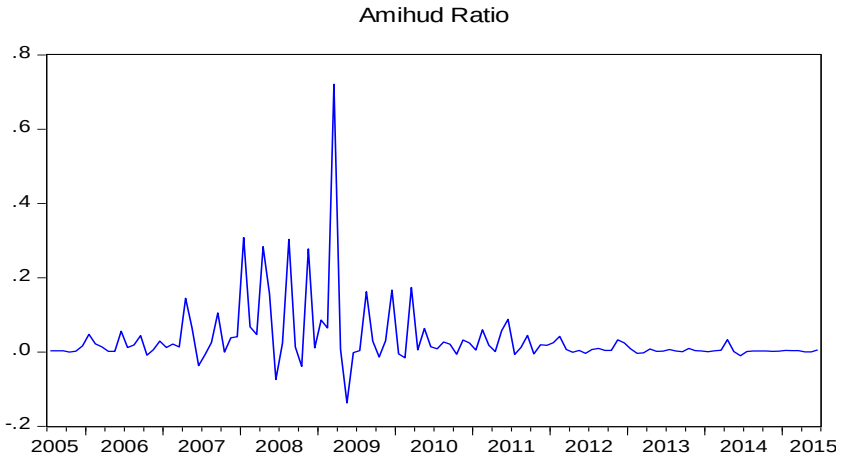

FIGURE 4.9: Innovations in Amihud Ratio

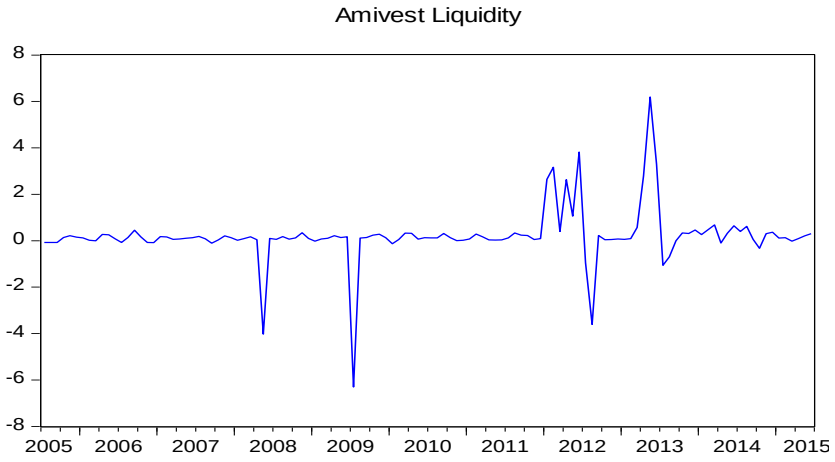

FIGURE 4.10: Innovations in Amivest Liquidity

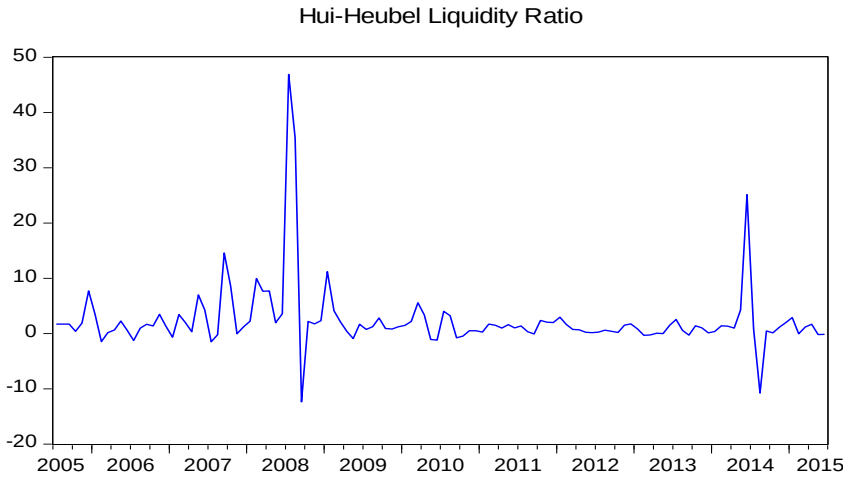

FIGURE 4.11: Innovations in Hui-Heubel Liquidity Ratio

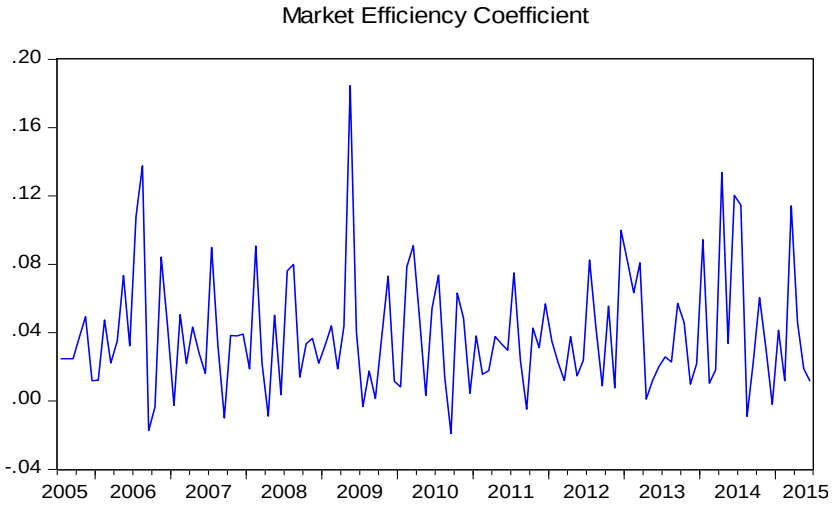

FIGURE 4.12: Innovations in Market Efficiency Coefficient

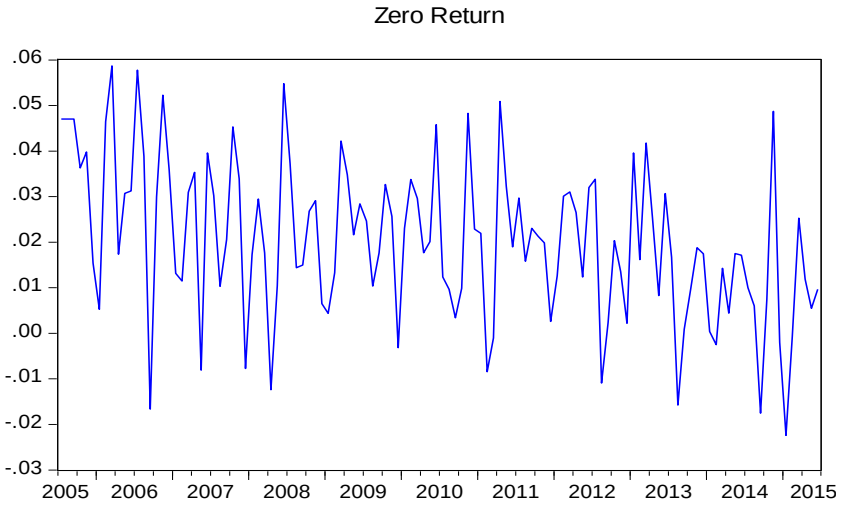

FIGURE 4.13: Innovations in Zero Return

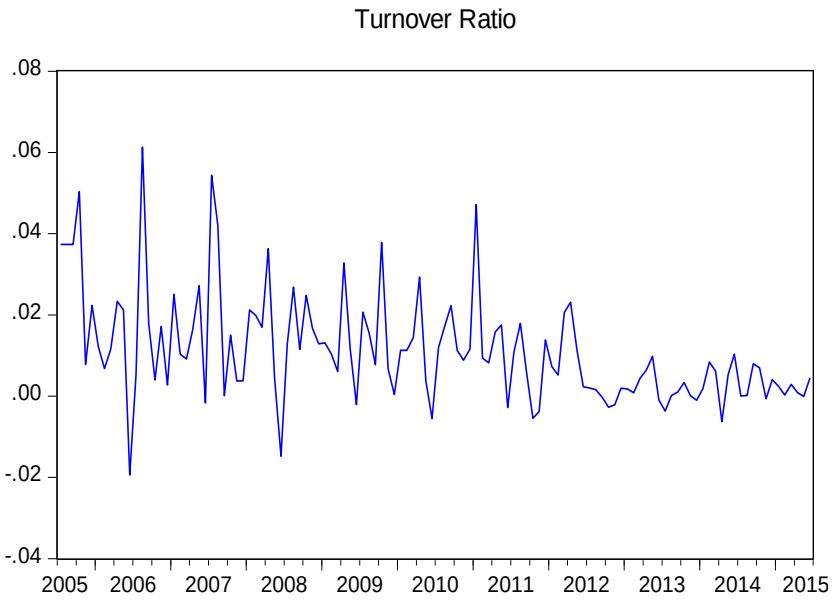

FIGURE 4.14: Innovations in Turnover Ratio

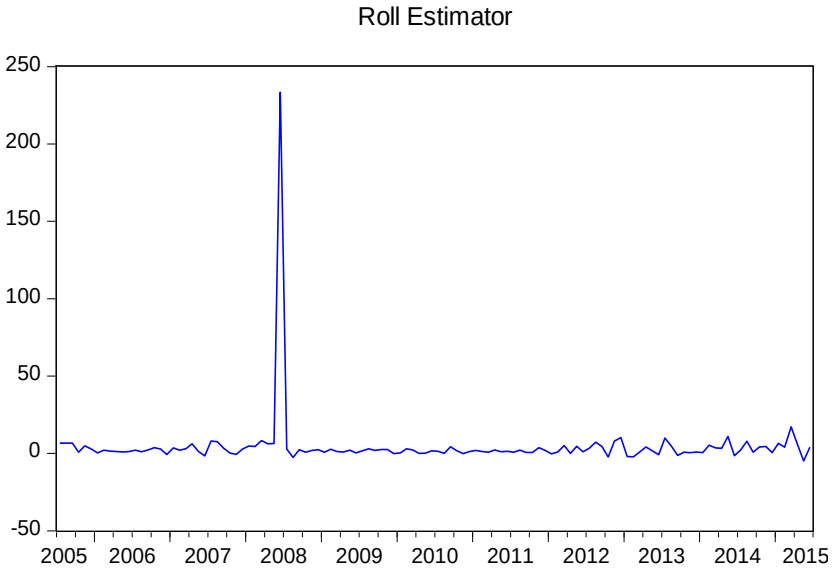

FIGURE 4.15: Innovations in Roll Estimator.

4.2.4 Market Liquidity

Figure 4.16 show a spike in illiquidity between 2008 and 2009 in response to worst intraday crash by 10% in the whole life of Tokyo stock exchange. Kawai and Takagi (2009) reported that Japan is among those countries that are badly affected by 2008-2009 economic crises. It is one of the advanced economies that experienced negative growth in 2008 and 2009 as well. A slight hump has been observed in 2014 due to Fukushima disaster.

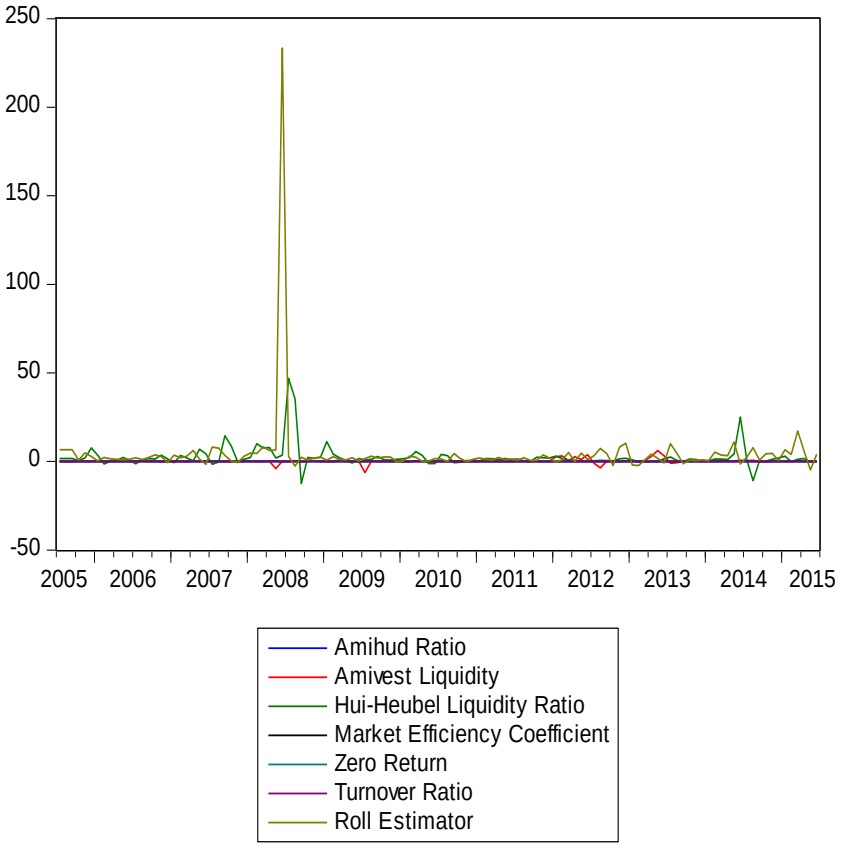

FIGURE 4.16: Market Liquidity

4.2.5 Betas for Decile Portfolios

Decile portfolios for each illiquidity measure are designed from lowest to highest level of illiquidity in consistent with Kim and Lee (2014) and Vu et al.,(2015). Price impact measures including Amihud ratio, Amivest liquidity, Hui-Huibel liquidity ratio,zero return, market efficiency coefficient reveal that all the betas show mixed trend. There is a magnificent increase in all betas in case of Amihud ratio in portfolio 9 as compared to portfolio 1 with increasing level of illiquidity. For other price impact measures the magnificent increase or decrease in all betas has not been observed during 2005-2015 in Tokyo stock exchange.

Similarly mixed trend is also observed in all betas in case of depth, breadth and transaction cost illiquidity measure. The findings of the study support the results of Lee (2011) and Vu et al., (2015). Table shows positive beta 2, negative beta 3 and 4 for all illiquidity measures support the LCAPM theory proposed by Acharya and Pedersen (2005) in developed capital market of Japan.

TABLE 4.13: Portfolio Betas for illiquidity.

Panel A Amihud Ratio						
Portfolio	β_1	β_2	β_3	β_4	β_5	β_6
(Lowest) 1	0.1115	0.1275	-0.0374	-0.0130	0.1779	0.2894
2	0.1173	0.0080	-0.0032	-0.0159	0.0272	0.1445
3	0.1071	0.0074	-0.0126	-0.0127	0.0327	0.1398
4	0.1352	0.0093	-0.0313	-0.0169	0.0576	0.1928
5	0.1140	-0.0062	-0.0158	-0.0109	0.0205	0.1345
6	0.1055	0.0081	-0.0037	-0.0171	0.0289	0.1344
7	0.1073	0.0180	-0.0043	-0.0224	0.0447	0.1520
8	0.1170	0.1609	-0.0099	-0.0132	0.1840	0.3010
9	0.4128	1.0790	-0.0860	-0.2732	1.4381	1.8509
(Highest) 10	0.4679	1.1141	-0.0957	-0.3274	1.5372	2.0051
Panel B Amivest Liquidity						
Portfolio	β_1	β_2	β_3	β_4	β_5	β_6
(Lowest) 1	0.0056	0.0016	-0.0029	0.0000	0.0046	0.0101
2	0.0070	0.0052	0.0000	-0.0001	0.0053	0.0123
3	0.0146	-0.0029	-0.0154	-0.0044	0.0169	0.0315
4	0.0096	0.1557	-0.0132	-0.0004	0.1694	0.1790
5	0.0105	0.1932	-0.0088	-0.0016	0.2035	0.2140
6	0.0134	0.4119	-0.0046	-0.0084	0.4249	0.4384
7	0.0136	0.5766	-0.0137	-0.0157	0.6060	0.6196
8	0.0113	0.5503	-0.0012	-0.0293	0.5808	0.5921
9	0.0134	0.6707	-0.0130	-0.0166	0.7003	0.7137
(Highest) 10	0.0111	0.7270	-0.0176	-0.0663	0.8109	0.8220
Panel C Hui -Huibel lLiquidity Ratio						
Portfolio	β_1	β_2	β_3	β_4	β_5	β_6
(Lowest) 1	0.0464	0.0060	-0.0013	0.0001	0.0072	0.0536
2	0.0426	0.0010	-0.0001	0.0001	0.0010	0.0436
3	0.0389	0.3921	0.0003	-0.0003	0.3921	0.4310
4	0.0405	-0.0021	-0.0007	-0.0001	-0.0013	0.0392

5	0.0462	0.1909	-0.0002	-0.0002	0.1913	0.2375
6	0.0405	0.0090	-0.0006	-0.0001	0.0097	0.0502
7	0.0512	0.0009	-0.0005	-0.0001	0.0015	0.0527
8	0.0327	0.0212	0.0003	-0.0001	0.0210	0.0537
9	0.0425	0.0982	-0.0012	0.0002	0.0991	0.1416
(Highest) 10	0.0237	0.3173	-0.0008	-0.0053	0.3234	0.3471
Panel D Zero Return						
Portfolio	β_1	β_2	β_3	β_4	β_5	β_6
(Lowest) 1	0.3935	0.1728	-0.0158	0.1076	0.0810	0.4745
2	0.4448	0.3999	-0.0277	-0.0118	0.4394	0.8843
3	0.4547	0.2924	0.0015	-0.1011	0.3921	0.8468
4	0.3144	0.2702	-0.1334	-0.0839	0.4875	0.8019
5	0.5303	0.1637	0.0264	0.0273	0.1101	0.6403
6	0.4391	0.4922	0.1435	0.0507	0.2980	0.7371
7	0.4268	0.8923	-0.0445	0.1360	0.8008	1.2276
8	0.4307	0.2701	-0.1027	0.0931	0.2797	0.7103
9	0.2441	0.9688	-0.0542	-0.0657	1.0887	1.3329
(Highest) 10	0.5554	1.6208	-0.0117	-0.0629	1.6953	2.2507
Panel E Market Efficiency Coefficient						
Portfolio	β_1	β_2	β_3	β_4	β_5	β_6
(Lowest) 1	0.2125	1.3165	-0.0237	-0.0578	1.3980	1.6105
2	0.1268	0.7202	-0.0408	-0.0120	0.7730	0.8997
3	0.1802	1.0912	-0.0524	-0.0901	1.2337	1.4139
4	0.1633	1.1068	-0.0927	-0.1198	1.3193	1.4827
5	0.1640	0.7632	-0.0427	-0.0819	0.8878	1.0519
6	0.2051	1.3373	-0.1317	-0.1507	1.6198	1.8249
7	0.1886	0.9402	-0.0979	-0.0472	1.0852	1.2738
8	0.1590	1.0803	-0.0604	-0.0810	1.2217	1.3808
9	0.1575	0.9519	-0.1114	-0.1134	1.1767	1.3341
(Highest) 10	0.1431	0.7886	-0.0608	-0.1797	1.0291	1.1723

Panel F Turnover Ratio						
Portfolio	β_1	β_2	β_3	β_4	β_5	β_6
(Lowest) 1	0.3048	-0.0403	-0.0372	0.3073	-0.3104	-0.0056
2	0.6826	-0.1009	-0.0994	0.6810	-0.6825	0.0001
3	0.6909	0.0432	0.0455	0.6901	-0.6924	-0.0015
4	0.6700	-0.0226	-0.0320	0.6722	-0.6627	0.0072
5	0.5474	-0.0286	-0.0288	0.5472	-0.5470	0.0004
6	0.5600	0.0213	0.0250	0.5596	-0.5633	-0.0033
7	0.5748	0.0890	0.0893	0.5744	-0.5747	0.0000
8	0.6135	0.0440	0.0332	0.6090	-0.5982	0.0153
9	0.6238	0.0058	0.0028	0.6251	-0.6221	0.0016
(Highest) 10	0.6395	0.0092	0.0068	0.6371	-0.6347	0.0048
Panel G Roll Estimator						
Portfolio	β_1	β_2	β_3	β_4	β_5	β_6
(Lowest) 1	0.0237	0.4427	0.0598	0.1659	0.2171	0.2408
2	0.0187	0.4299	-0.0459	-0.1110	0.5868	0.6055
3	0.0241	0.4914	0.0178	0.0566	0.4171	0.4412
4	0.0255	0.3601	-0.0278	-0.1101	0.4980	0.5236
5	0.0247	0.0732	0.0417	0.0271	0.0044	0.0291
6	0.0340	0.1202	0.0491	0.0153	0.0558	0.0898
7	0.0252	0.2042	0.0603	0.0686	0.0753	0.1005
8	0.0286	0.7356	-0.0061	0.0862	0.6556	0.6841
9	0.0274	0.4962	0.0909	-0.0061	0.4114	0.4388
(Highest) 10	0.0273	0.2164	0.0885	0.1609	-0.0331	-0.0059

4.2.6 Results of Liquidity Adjusted Capital Asset Pricing Model for Japan

Panel regression has been employed to test the LCAPM specifications for each illiquidity measure. The results of Panel regression are discussed below.

4.2.6.1 Liquidity Adjusted Capital Asset Pricing Model Based on Amihud Ratio

Table 4.14 reports the results of panel regression of Amihud ratio. The statistically significant positive coefficients (0.076, 0.081, 0.078, 0.08, 0.086, 0.092 and 0.108) of E_c demonstrate Amihud ratio has a significant impact on excess returns of Tokyo stock exchange during the sample period. Price change per yen trading volume has been observed in this capital market. β_1 is statically significant in 1^{st}, 2^{nd} and 7^{th} model at 1% and 5% significant level demonstrating the association between return premium and Amihud measure. Suke (2017) also provides the empirical evidence for association between Amihud ratio and return premium of Japan electric power exchange.

Liquidity betas β_2, and β_4 are significant with expected signs(0.031,-0.028) at 1% significance level indicating individual liquidity risks have been priced in Japan stock market during 2005-2015 and support first and third hypothesis of study. β_3 is negative but statistically insignificant in Tokyo stock exchange. in the study of commonality beta (β_2) and equity pricing.The finding of the study indicates that investors receive commonality premium in their expected returns in Tokyo stock exchange. The result also supports the empirical evidence provided by Sullivan et al.(2015) in the study of commonality beta (β_2) and equity pricing.

Third hypothesis in line with Acharya and Pedersen (2005) reveals that investors accept lower returns on those stocks that are liquid in market down turns. The finding of the study is in consistent with Acharya and Pedersen (2005). As far as aggregate liquidity risks and systematic risks are considered; results of statistically significant positive coefficients of β_5 and β_6 at 1% significance level show that liquidity risks and systematic risks has been priced at aggregate level in Tokyo stock exchange during 2005-2015 after controlling momentum and firm size. This supports the fourth and fifth hypotheses of study that higher returns are expected from the stocks having higher level of aggregate liquidity and systematic risks.

Controlling factors like momentum are statistically negatively significant in all models revealing that weak momentum effect has been observed over past 12

months during sample period in this financial market. At 1% significance level firm size is statistically negative significant in 2nd, 5th and 6th models supporting firm size anomaly exist in trading of equities in Japan stock market.

TABLE 4.14: Results of LCAPM Based on Amihud Ratio

	Models						
Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Constant	-0.048**	0.231***	-0.045**	0.010**	0.226***	0.308***	0.561***
	(-2.10)	-4.09	(-2.02)	-2.22	-4.09	-5.49	-8.69
E_c	0.076***	0.081***	0.078***	0.080***	0.086***	0.092***	0.108***
	-6.08	-6.76	-6.18	-6.49	-7.12	-7.42	-9.21
$\beta 1$	0.011***	0.017***	0.004	0.009	0.007**		0.050***
	-4.51	-6.96	-0.74	-1.56	-2.08		-5.18
$\beta 2$		0.031***					0.061***
		-7.5					-10.8
$\beta 3$			-0.031				-0.311***
			(-1.17)				(-9.24)
$\beta 4$				-0.028***			-0.014*
				(-3.86)			(-1.73)
$\beta 5$					0.025***		
					-7.73		
$\beta 6$						0.016***	
						-5.21	
Firm Size	0.002	-0.009***	0.002	0.001	-0.008***	-0.011***	-0.021***
	-1.09	(-4.15)	1.01	(-0.25)	(-4.15)	(-5.54)	(-8.79)
Momentum	-0.046***	-0.039***	-0.046***	-0.051***	-0.044***	-0.018	-0.031***
	(-3.51)	(-3.05)	(-3.49)	(-3.89)	(-3.05)	(-1.40)	(-2.56)
F-statistics	6.08	10.1	5.75	6.82	10.37	6.65	15.21
F –statistics(p)	0	0	0	0	0	0	0
Adjusted R	0.08	0.14	0.08	0.1	0.15	0.09	0.23

E_c (liquidity level), β_1 (market risk), β_2 (Commonality beta), β_3 (Flight to liquidity beta), β_4 (Depressed wealth beta), β_5 (Aggregate liquidity beta), β_6 (Systematic risk).

** indicate 10% level of significance, ** indicate 5% level of significance and *** indicate 1% level of significance.*

4.2.6.2 Liquidity Adjusted Capital Asset Pricing Model Based on Amivest Liquidity

Regression results of seven LCAPM specification of illiquidity measure Amivest liquidity are discussed in table 4.15. The statistical significant positive coefficients of E_c at 1% significance level indicate that Amivest liquidity has effect on equity returns in Tokyo stock exchange during the data period.

Liquidity betasβ_2 is significant demonstrating commonality in liquidity risk exist in Tokyo stock exchange. β_3 and β_4 are statistically insignificant at individual level in 3rd and 4th models demonstrating flight to liquidity and depressed wealth betas are not priced in this financial market in the context of Amivest liquidity.

The sign of β_3 and β_4 are in line with Pastor and Stambaugh (2003) and Acharya and Padersen (2005) but commonality beta β_2 is insignificant with negative sign and contradict with Chordia et al., (2000). The statistically significant negative coefficients (-0.24 and -0.27) of β_5 and β_6 demonstrates illiquidity risk is more in Japan stock market as compared to market risk and support fourth and fifth hypotheses of the study.

Firm size is found to be insignificant or positively significant in all models. This shows that firm size anomaly has not been seen in the context of Amivest illiquidity. However momentum is statistically positive significant indicating momentum effect is strong in the financial market of Japan stock exchange during 2005-2015.

4.2.6.3 Liquidity Adjusted Capital Asset Pricing Model Based on Hui-Heubel Liquidity Ratio

Table 4.16 discusses the panel regression results to estimate the LCAPM specifications by taking illiquidity measure Hui Heubel Liquidity Ratio. E_c is statistically significant at 10% significant level revealing that Hui-Heubel liquidity ratio has impact on equity returns in Tokyo stock exchange in data period (2005-2015). It means frequent price movements are observed in the financial market of Japan.

The positive significant coefficients of β_1 at 1% significance level show that market risk has been priced in Tokyo stock exchange.

TABLE 4.15: Results of LCAPM Based on Amivest Liquidity

	Models						
Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Constant	-0.048***	-0.111**	-0.084***	-0.155***	-0.637***	-0.841***	-2.358***
	(-2.74)	(-2.52)	-2.7	(-2.68)	(-2.46)	(-4.11)	(-7.31)
E_c	0.070***	0.073***	0.072***	0.070***	0.060***	0.064***	0.004
	-3.55	-3.7	-3.65	-3.5	-3.08	-3.25	0.18
$\beta 1$	0.036***	0.051***	0.018	0.036	0.265***		0.876***
	-2.27	-2.81	-0.84	-0.04	-3.58		-8.78
$\beta 2$		-0.045**					-0.978***
		(-1.75)					(-8.70)
$\beta 3$			-0.055				-0.447***
			(-1.22)				(-4.04)
$\beta 4$				-0.001			2.273***
				(-0.02)			-9.08
$\beta 5$					-0.244***		
					(-3.16)		
$\beta 6$						-0.272***	
						(-3.67)	
Firm Size	0.007	0.007	0.004	0.007	0.036***	0.046***	0.136***
	-0.78	-0.81	-0.43	-0.73	-2.87	-4.35	-8.11
Momentum	0.052***	0.057***	0.056***	0.052***	0.047***	0.049***	0.066***
	-4.99	-5.28	-5.12	-4.81	-4.48	-4.78	-6.26
F-statistics	6.73	6.49	6.36	6.24	7.04	7.45	11.52
F-statistics(p)	0	0	0	0	0	0	0
Adjusted R	0.05	0.05	0.03	0.04	0.03	0.04	0.06

*E_c (liquidity level), β_1 (market risk), β_2 (Commonality beta), β_3 (Flight to liquidity beta), β_4 (Depressed wealth beta), β_5 (Aggregate liquidity beta), β_6 (Systematic risk). * indicate 10% level of significance, ** indicate 5% level of significance and *** indicate 1% level of significance.*

Individual liquidity betas β_2, β_3 and β_4 are insignificant indicating commonality beta, return sensitivity to liquidity beta and liquidity sensitivity to return are not priced in the context of Hui-Heubel liquidity ratio in stock market of Japan.

As far as cumulative betas β_5 and β_6 are considered β_5 is insignificant but β_6 is significant at 1% significance level. The result of the table support the existence of systematic risk rather liquidity risk in -Tokyo stock exchange with reference to Hui-Heubel liquidity ratio.

TABLE 4.16: Results of LCAPM Based on Hui-Heubel Liquidity Ratio

	Models						
Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Constant	0.360***	0.367***	0.325***	0.359***	0.367***	0.130***	0.331***
	-11.01	-10.83	-7.85	-10.94	-10.84	-4.92	-7.79
E_c	0.001*	0.001*	0.001	0.001*	0.001*	0.001*	0.001
	(-1.72)	(-1.72)	(-1.45)	(-1.72)	(-1.72)	(-1.86)	-1.47
$\beta 1$	2.210***	2.343***	1.821***	2.850***	2.343***		1.267***
	-12.22	-10.19	-7.89	-11.91	-10.22		)7.27)
$\beta 2$		-0.003					-0.003
		-0.8					-0.97
$\beta 3$			0.852				0.88
			1.35				1.38
$\beta 4$				0.089			0.607
				0.1			0.62
$\beta 5$					-0.003		
					-0.81		
$\beta 6$						0.017***	
						-6.3	
Firm Size	-0.013***	-0.014***	-0.012***	-0.013***	-0.014***	-0.005***	-0.012***
	(-11.13)	(-10.99)	(-7.86)	(-11.03)	(-11.00)	(-5.15)	(-7.80)
Momentum	-0.108***	-0.108***	-0.104***	-0.108***	-0.108***	-0.059***	-0.103***
	(-7.91)	(-7.93)	(-7.46)	(-7.76)	(-7.93)	(-4.31)	(-7.24)
F-statistics	13.11	12.22	12.32	12.16	12.22	4.48	10.83
F –statistics(p)	0	0	0	0	0	0	0
Adjusted R	0.17	0.17	0.18	0.18	0.18	0.18	0.18

*E_c (liquidity level), β_1 (market risk), β_2 (Commonality beta), β_3 (Flight to liquidity beta), β_4 (Depressed wealth beta), β_5 (Aggregate liquidity beta), β_6 (Systematic risk). * indicate 10% level of significance, ** indicate 5% level of significance and *** indicate 1% level of significance.*

Firm size is negative but significant. It means firm size anomaly exists in Tokyo stock exchange in the context of Hui-Heubel liquidity rstio.

4.2.6.4 Liquidity Adjusted Capital Asset Pricing Model Based on Zero Return

Panel regression results of LCAPM specifications in the context of zero return have been reported in table 4.17. The negative significant coefficients of E_c at 1% significance level indicate that zero return have impact on equity returns in Tokyo stock exchange during 2005-2015. Informed investors will trade if the transaction cost is easily wave off from the gain of private information.

High transaction cost of low liquid stocks will reduce the informed trading that lead to observe more zero return days. This makes the stock risky and its performance is worst in capital market. The result of the study also favors the study of Epitropou, P. (2015) that demonstrates more negative liquidity betas of stocks are more risky and have more zero return days as compared to positive liquid betas.

Individual liquidity betas β_2, β_3 and β_4 are statistically positive significant at 1% significance level. Investor receives 2.8% commonality liquidity premium for the stocks that becomes illiquid with market illiquidity and support first hypothesis of the study.

The contradict signs of β_3 and β_4 also show the traces of expected illiquidity in Japan during the sample period (Fang, Sun and Wang 2006). Therefore investors earn more return if they take flight to liquidity risk and depressed wealth effect of liquidity risk in Japan stock market during sample period.

At 1% significance level aggregate liquidity and systematic risk β_5 and β_6 are significant. Positive coefficients (0.01 and 0.04) of aggregate risk betas indicate liquidity risks and systematic risks are priced in equities of Tokyo stock exchange. The results of the study accept fourth and fifth hypotheses of the LCAPM model.

Firm size is insignificant. It demonstrates that firm size anomaly in the context of zero return has not been seen in stock market of Japan. Momentum is statistically positive significant indicating strong effect of momentum in Tokyo stock exchange.

Adjusted R^2 is 10 to 11 percent in all LCAPM specifications. This shows that contribution of zero return in influencing stock returns through illiquidity risk is less as compared to other liquidity proxies used in the study. This seems that result of the current study is sensitive to liquidity proxies used in the study.

TABLE 4.17: Results of LCAPM Based on Zero Return

	Models						
Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Constant	0.164***	-0.048***	0.063***	0.079***	0.116***	-0.093***	-0.002***
	-5.01	(-2.66)	-2.39	-2.88	-2.45	(-2.21)	(-2.03)
E_c	-0.123***	-0.120***	-0.119***	-0.115***	-0.125***	-0.130***	-0.118***
	(-3.97)	(-3.89)	(-3.85)	(-3.70)	(-4.00)	(-4.17)	(-3.78)
$\beta 1$	-0.025***	-0.016**	-0.060***	-0.050***	-0.011		-0.036
	(-5.01)	(-2.70)	(-4.97)	(-5.49)	-0.5		-1.43
$\beta 2$		0.028***					0.015
		-3.31					0.93
$\beta 3$			0.076***				0.015
			-3.17				0.28
$\beta 4$				0.049***			0.018
				-3.24			0.51
$\beta 5$					0.011**		
					-2.05		
$\beta 6$						0.047***	
						-4.02	
Firm Size	-0.006***	0.001	-0.001	-0.002	-0.004	0.002	0.001
	(-4.89)	-0.6	(-0.73)	(-1.34)	(-1.86)	-1.42	-0.13
Momentum	0.053***	0.051***	0.047***	0.049***	0.053***	0.065***	0.049***
	-4.64	-4.5	-4.16	-4.33	-4.68	-6.04	-4.29
F-statistics	7.27	7.63	7.55	7.59	6.78	6.51	6.72
F- statistics(p)	0	0	0	0	0	0	0
Adjusted R	0.1	0.11	0.11	0.11	0.1	0.1	0.11

*E_c (liquidity level), β_1 (market risk), β_2 (Commonality beta), β_3 (Flight to liquidity beta), β_4 (Depressed wealth beta), β_5 (Aggregate liquidity beta), β_6 (Systematic risk). * indicate 10% level of significance, ** indicate 5% level of significance and *** indicate 1% level of significance.*

4.2.6.5 Liquidity Adjusted Capital Asset Pricing Model Based on Market Efficiency Coefficient

Panel Regression with fixed effect has been run to test seven LCAPM specifications in the context of market efficiency coefficient after controlling firm size and momentum in a developed market Japan and results are reported in table 4.18.

Table shows E_c is statistically positive significant at 5% and 1% significance level that indicates price influencing indicator of illiquidity has an impact on excess return of equities in the developed financial market of Japan during the sample period starting from July 2005 and ends at June 2015.

In short term and long term volatilities; prices take time for reaching new equilibrium levels in financial market Lamas and Broto (2016). The positive significant coefficient of Commonality beta β_2 in second model indicates that investors demand 4% commonality premium for illiquid stocks in illiquid market conditions of Tokyo stock exchange.

The result of the study is in consistent of LCAPM theory and support the first hypothesis that commonality liquidity risk is priced in developed financial market.

Return sensitivity to liquidity β_3 and liquidity sensitivity to return β_4 are statistically significant at 1% significance level. The significant negative coefficients of β_3 and β_4 indicate that investor accepts lower returns -8.7% and -8.3% for those stocks that are liquid in illiquid conditions of market or in bearish return situation of market.

The findings also support the second and third hypotheses of the study and favor the Pastor and Stambaugh (2003) and Acharya and Pedersen (2005) study conducted in developed market. Moreover the results also support the studies conducted by Vu et al.(2015) and Saman (2016) in developed stock markets of Australia and UK.

As far as combined betas β_5 and β_6 of fifth and sixth model of the study are analyzed. These are statistically significant at 1% significance level. Investors receive 24% aggregate illiquid premium and 29% aggregate systematic risk premium on equities return in Japan stock market.

The results also support the fourth and fifth hypotheses of the study.

TABLE 4.18: Results of LCAPM Based on Market Efficiency Coefficient

	Models						
Variable	1	2	3	4	5	6	7
Constant	0.093**	-0.240***	-0.122***	-0.119***	-0.566***	-0.712***	-0.502***
	-2.53	(-4.49)	(-2.72)	(-2.59)	(-5.94)	(-7.61)	(-5.42)
E_c	0.035**	0.038**	0.035**	0.037**	0.046***	0.042***	0.032**
	-2.18	-2.45	-2.25	-2.37	-2.94	-2.62	-2.07
1	-0.096***	-0.099***	-0.140***	-0.152***	0.177***		0.161***
	(-7.62)	(-8.24)	(-10.47)	(-10.56)	-4.59		-3.41
2		0.043***					0.186***
		-8.25					-5.4
3			-0.087***				0.326***
			(-7.75)				-3
4				-0.084***			-0.646***
				(-7.25)			(-5.73)
5					0.247***		
					-7.44		
6						0.298***	
						-9.12	
Firm Size	-0.003**	0.008***	0.005***	0.005***	0.012***	0.015***	0.012***
	(-2.15)	-4.26	-3.06	-2.93	-5.02	-3.06	-4.99
Momentum	-0.049***	-0.071***	-0.072***	-0.070***	-0.048***	-0.072***	-0.068***
	(-3.80)	(-5.62)	(-5.63)	(-5.45)	(-3.86)	(-2.72)	(-5.44)
F-statistics	5.27	10.22	9.59	9.23	9.23	7.23	11.77
F –statistics(p)	0	0	0	0	0	0	0
Adjusted R	0.15	0.14	0.14	0.13	0.13	0.13	0.19

*E_c (liquidity level), β_1 (market risk), β_2 (Commonality beta), β_3 (Flight to liquidity beta), β_4 (Depressed wealth beta), β_5 (Aggregate liquidity beta), β_6 (Systematic risk). * indicate 10% level of significance,*

*** indicate 5% level of significance and *** indicate 1% level of significance.*

Commonality beta β_2, return sensitivity to liquidity beta β_3 and liquidity sensitivity to return beta β_4 are insignificant demonstrating that individual illiquidity risks

are not priced in Tokyo stock exchange under turnover ratio during the sample period.

4.2.6.6 Liquidity Adjusted Capital Asset Pricing Model Based on Turnover Ratio

Table 4.19 reports the results of regression employed to test the LCAPM specifications with the perspective of breadth and depth indicator turnover in Tokyo stock exchange. Panel regression with fixed effect indicates that residuals of AR (2) regression of Turnover ratio (E_c) has a significant positive effect on the excess returns of equities in Japan during the sample period. The level of illiquidity positively affects the excess return in Japan stock market.

Commonality beta β_2, return sensitivity to liquidity beta β_3 and liquidity sensitivity to return beta β_4 are insignificant demonstrating that individual illiquidity risks are not priced in Tokyo stock exchange under turnover ratio during the sample period.

The negative significant coefficients of aggregate betas at 1% significance level indicate that total systematic risk and total liquidity risk are priced in Tokyo stock exchange. Negative sign reveals that liquidity risk is more as compared to market risk in Japan stock market under turnover ratio. Momentum is significant at 1% significance level demonstrating the effect of momentum is strong during data period (2005-2015).

4.2.6.7 Liquidity Adjusted Capital Asset Pricing Model Based on Roll Estimator

Panel regression has been employed on liquidity betas, aggregate liquidity risks and total systematic risk after controlling firm size and momentum to test seven LCAPM specifications in the perspective of transaction cost estimator of illiquidity and results are reported in table 4.20. The residuals of AR (2) regression of Roll estimator (E_c) is statistically positive significant at 1% significance level. The coefficients indicate .001% effect of transaction cost on excess return with

the increase in level of illiquidity that is very lowest. Domowitz et al. (2001) empirically proved that high execution cost with level of illiquidity worst the stock return. All individual liquidity betas are statistically significant according to the expected sign of LCAPM theory and are priced in Japan stock market during 2005-2015. The positive significant coefficient of Commonality beta β_1 at 1% significance level reveals that commonality premium of 9.8% receive in Tokyo stock exchange. The finding of the study also accepts the first hypothesis of the study.

TABLE 4.19: Results of LCAPM Based on Turnover

	Models						
Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Constant	-0.048***	-0.111***	-0.084***	-0.155***	-0.637***	-0.841***	-2.358***
	(-2.74)	(-2.52)	(-2.70)	(-2.68)	(-2.46)	(-4.11)	(-7.31)
E_c	0.070***	0.073***	0.072***	0.070***	0.060***	0.064***	0.004
	-3.55	-3.7	-3.65	-3.5	-3.08	-3.25	0.18
1	0.036**	0.051***	0.018	0.036	0.265***		0.876***
	-2.27	-2.81	-0.84	-0.04	-3.58		-8.78
2		-0.045					-0.978***
		(-0.75)					(-8.70)
3			-0.055				-0.447***
			(-1.22)				(-4.04)
4				-0.001			2.273***
				(-0.02)			-9.08
5					-0.244***		
					(-3.16)		
6						-0.272***	
						(-3.67)	
Firm Size	0.007	0.007	0.004	0.007	0.036***	0.046***	0.136***
	-0.78	-0.81	-0.43	-0.73	-2.87	-4.35	-8.11
Momentum	0.052***	0.057***	0.056***	0.052***	0.047***	0.049***	0.066***
	-4.99	-5.28	-5.12	-4.81	-4.48	-4.78	-6.26
F-statistics	6.73	6.49	6.36	6.24	7.04	7.45	11.52
F –statistics(p)	0	0	0	0	0	0	0
Adjusted R	0.23	0.23	0.2	0.2	0.21	0.22	0.25

*E_c (liquidity level), β_1 (market risk), β_2 (Commonality beta), β_3 (Flight to liquidity beta), β_4 (Depressed wealth beta), β_5 (Aggregate liquidity beta), β_6 (Systematic risk). * indicate 10% level of significance, ** indicate 5% level of significance and *** indicate 1% level of significance.*

TABLE 4.20: Results of LCAPM Based on Roll Estimator

	Models						
Variable	1	2	3	4	5	6	7
Constant	0.153***	0.159***	-0.266***	-0.351***	0.158***	0.162***	-0.534***
	-3.86	-4.03	(-3.32)	(-4.06)	-4.01	-4.11	(-5.83)
E_c	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
	-8.24	-8.79	-6.93	-6.44	-8.8	-8.83	-7.28
1	-0.17	-0.198	-0.128***	-0.159***	-0.201		-0.230***
	(-0.97)	(-1.13)	(-5.07)	(-5.73)	(-1.15)		(-7.45)
2		0.098***					0.194***
		-2.94					-5.69
3			-0.086***				0.139**
			(-5.98)				-2.27
4				-0.091***			-0.248***
				(-6.51)			(-4.13)
5					0.100***		
					-2.97		
6						0.097***	
						-2.91	
Firm Size	-0.006***	-0.009***	0.010***	0.013***	-0.009***	-0.010***	0.013***
	(-3.95)	(-4.92)	-3.31	-4.04	(-4.95)	(-4.98)	-3.9
Momentum	-0.042***	-0.055***	-0.033***	-0.032***	-0.055***	-0.056***	-0.055***
	(-3.30)	(-4.12)	(-2.67)	(-2.59)	(-4.13)	(-4.17)	(-4.31)
F-statistics	6.13	6.37	8.53	9.05	6.37	6.77	10.44
F –statistics(p)	0	0	0	0	0	0	0
Adjusted R	0.1	0.1	0.12	0.13	0.09	0.09	0.17

*E_c (liquidity level), β_1 (market risk), β_2 (Commonality beta), β_3 (Flight to liquidity beta), β_4 (Depressed wealth beta), β_5 (Aggregate liquidity beta), β_6 (Systematic risk). * indicate 10% level of significance, ** indicate 5% level of significance and *** indicate 1% level of significance.*

4.3 Statistical Analysis of China

4.3.1 Descriptive Statistics of Stock Returns and Illiquidity Proxies

Statistical behavior of Shenzhen stock exchange during July 2005- June 2015 has been reported in table 4.21. Deviation has been observed between maximum and minimum values of price impact illiquidity measures reveals less liquidity in China stock market. Maximum return in Shenzhen stock market is 5.3%. The lowest turnover during the sample period is 1.23%. The transaction cost illiquidity measure; Roll estimator maximum value is 1.17 during the data period. The lower standard deviation of illiquidity measures; Amivest liquidity, market efficiency coefficient, zero return and Roll estimator, from the mean demonstrating 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 the distribution is rightly skewed. Excess kurtosis has been observed in data set of illiquidity.

Table 4.21: Summary of Descriptive Statistics of Illiquidity Proxies and Equity Returns.

Variables	**Amihud Measure (AM)**	**Amivest Liquidity (AL)**	**Hui-Heubel Liquidity Ratio (HHLR)**	**Market Efficiency Coefficient (MEC)**	**Zero Return (ZR)**	**Turnover Ratio (TR)**	**Roll Estimator (RE)**	**Stock Returns (Ri)**
Mean	0.3415	4.1552	0.3601	0.0578	0.0510	0.0617	0.2060	0.0013
Median	0.1125	3.6780	0.0828	0.0431	0.0454	0.0384	0.1726	0.0031
Maximum	7.3980	15.6778	4.3582	0.2413	0.1608	0.7258	1.1717	0.0538
Minimum	0.0135	1.1496	0.0299	0.0130	0.0126	0.0123	0.0130	-0.0763
Std. Dev.	0.9480	2.5388	0.7656	0.0418	0.0271	0.0829	0.1477	0.0180
Skewness	6.2619	2.0712	3.1739	2.4128	1.2740	5.0468	3.0585	-0.7610
Kurtosis	44.3916	8.4209	13.2713	9.6958	4.8360	36.8807	17.8135	5.9952
Observations	6000	6000	6000	6000	6000	6000	6000	6000

4.3.2 Correlation Matrix of Illiquidity Proxies

The association among all illiquidity measures is within tolerable limits. Therefore all illiquidity proxies are used for further analysis. The relationship between Amihud measure is positively related with other price impact illiquid measures including Hui-Heubel liquidity ratio, market efficiency coefficient and zero return. There is negative association between turnover ratio and price impact measures except Amivest liquidity. The possible reason is high price impact reduce the turnover in equities of China stock market (Lou and Shu 2017). Roll estimator has a positive association with price impact factors as less liquid stocks are exposed to adverse price movements that will cause the spread larger. There is positive association between turnover and Roll estimator and contradict with the theory. Hartmann (1996) empirically proved that unpredictable turnover leads to increase the spread.

TABLE 4.22: Correlation Matrix of Illiquidity Proxies.

Variables	**Amihud Measure (AM)**	**Amivest Liquidity (AL)**	**Hui-Heubel Liquidity Ratio (HHLR)**	**Market Efficiency Coefficient (MEC)**	**Zero Return (ZR)**	**Turnover Ratio (TR)**	**Roll Estimator (RE)**
Amihud Measure (AM)	1	-0.1791	0.5395	0.3178	0.1709	-0.0484	0.3273
Amivest Liquidity (AL)	-0.1791	1	-0.2786	-0.2134	-0.0360	0.7236	0.1699
Hui-Heubel Liquidity Ratio (HHLR)	0.5395	-0.2786	1	0.5693	0.0671	-0.0600	0.0715
Market Efficiency Coefficient (MEC)	0.3178	-0.2134	0.5693	1	0.0006	-0.0521	0.0139
Zero Return (ZR)	0.1709	-0.0360	0.0671	0.0006	1	-0.0864	0.0174
Turnover Ratio (TR)	-0.0484	0.7236	-0.0600	-0.0521	-0.0864	1	0.1101
Roll Estimator (RE)	0.3273	0.1699	0.0715	0.0139	0.0174	0.1101	1

4.3.3 Innovations in Illiquidity Measures

Time series innovations of each liquidity measure in Shenzhen Stock exchange during 2005-2015 are shown below.Variations in illiquidity cost have been observed in illiquidity measures except Amihud ratio and Hui-Heubel liquidity ratio during 2005-2015 in China stock market.

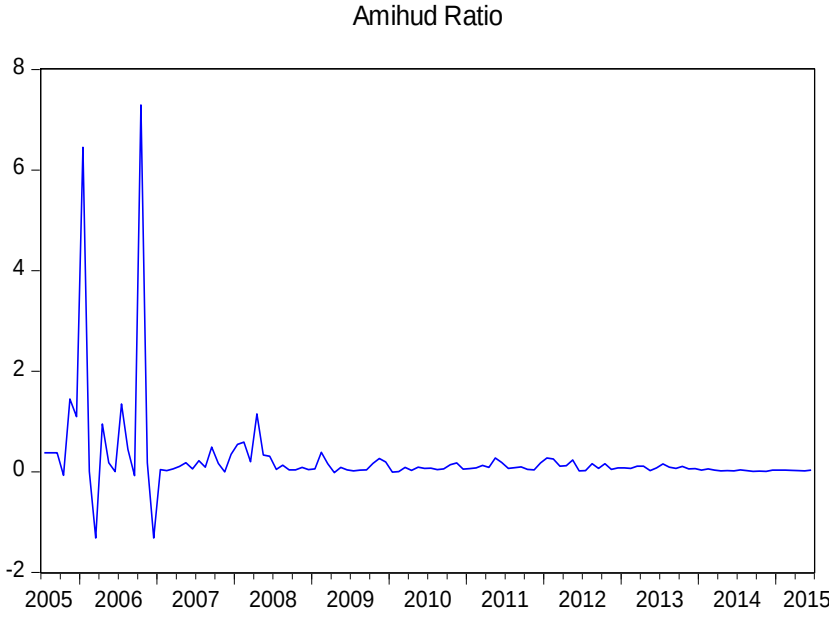

FIGURE 4.17: Innovations in Amihud Ratio.

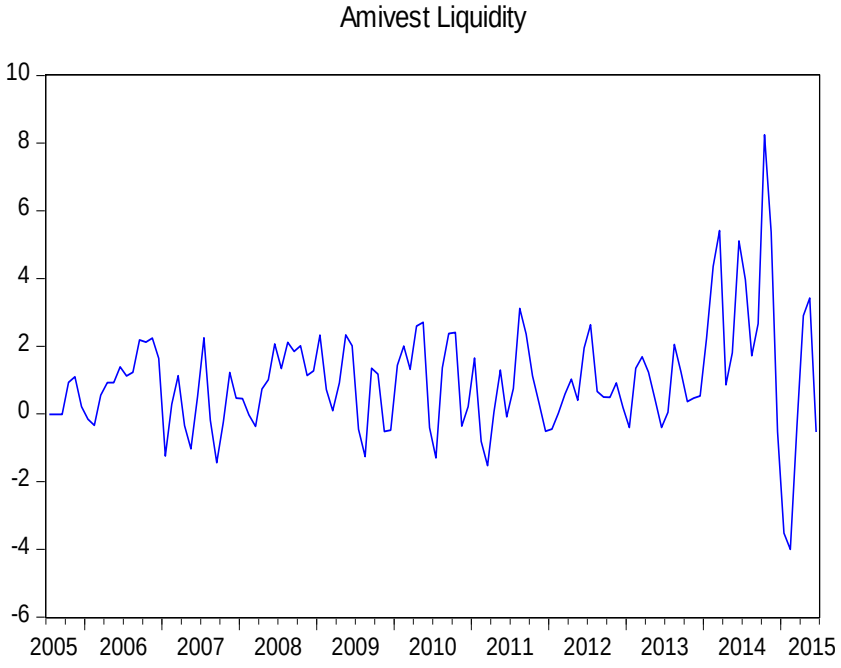

FIGURE 4.18: Innovations in Amivest Liquidity.

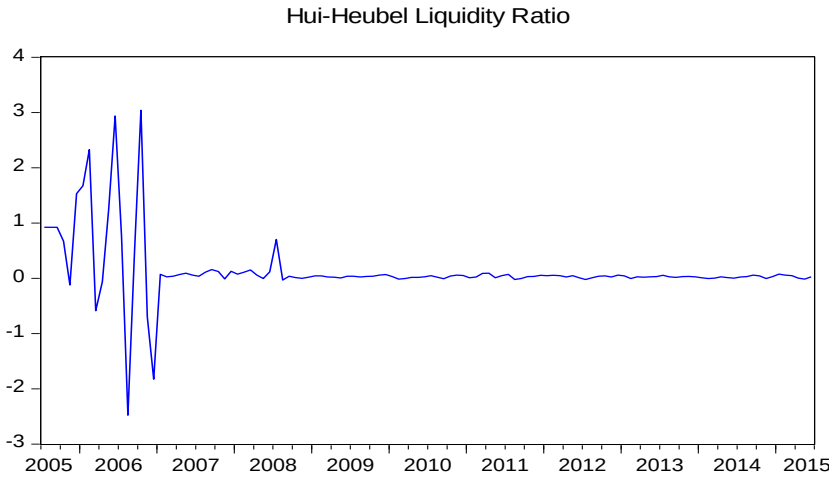

FIGURE 4.19: Innovations in Hui-Heubel Liquidity Ratio.

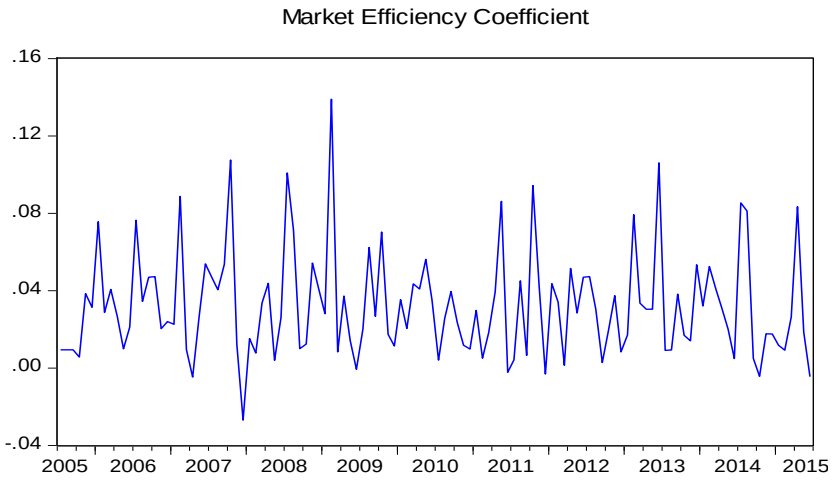

FIGURE 4.20: Innovations in Market Efficiency Coefficient.

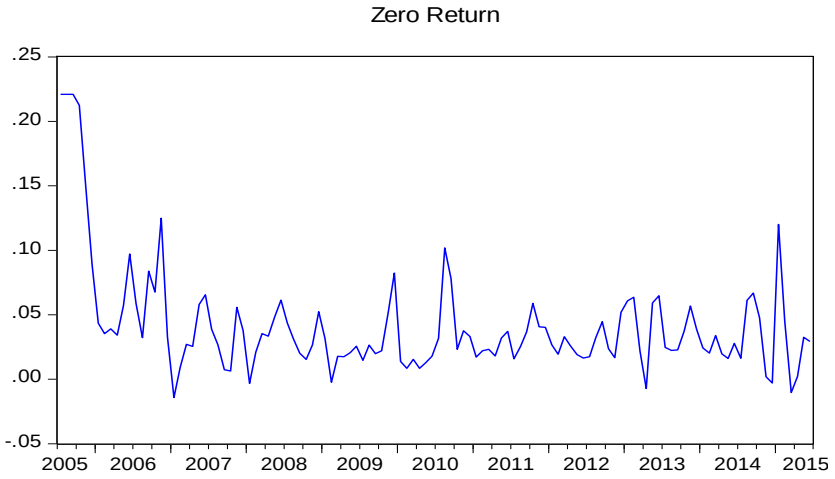

FIGURE 4.21: Innovations in Zero Return.

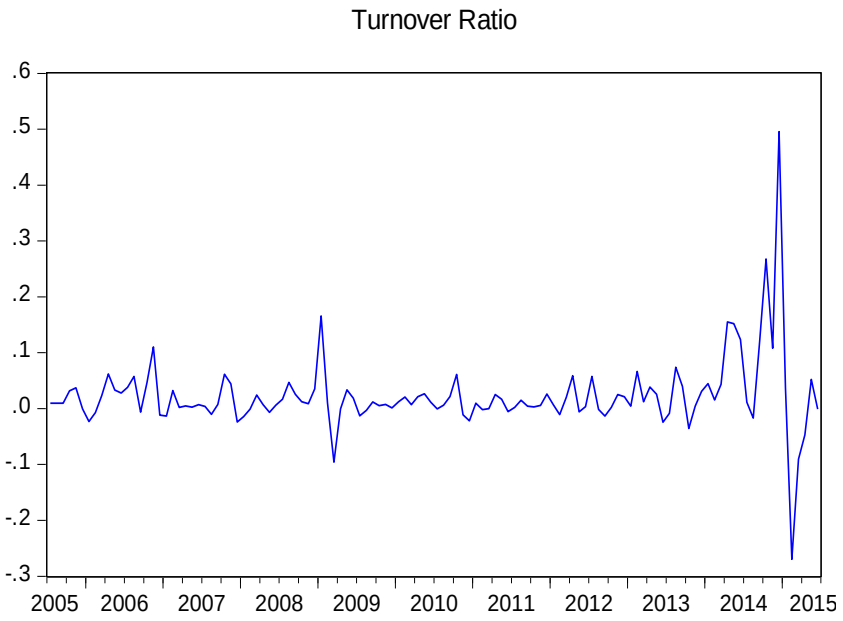

FIGURE 4.22: Innovations in Turnover Ratio.

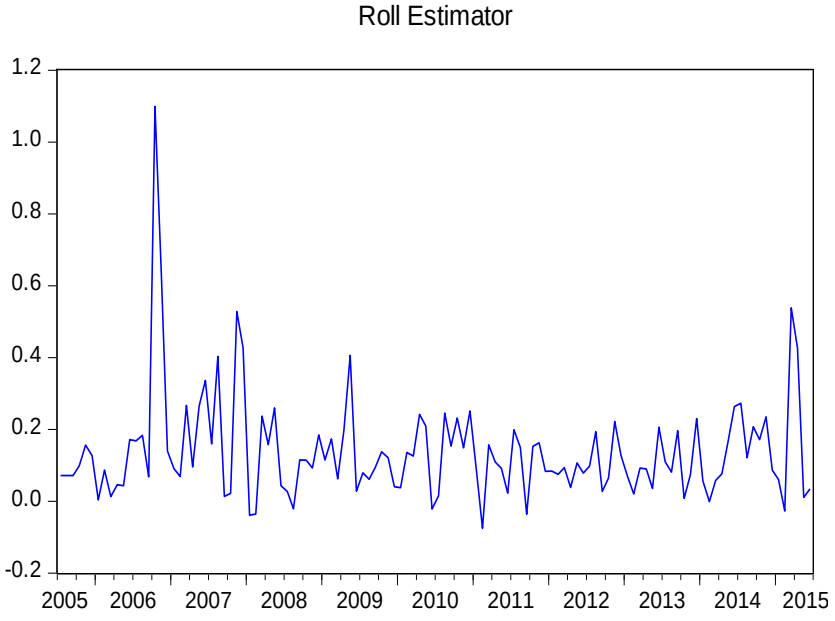

FIGURE 4.23: Innovations in Roll Estimator.

4.3.4 Market Liquidity

During 2005-2007 illiquidity spikes have been observed after Asian financial crises in China. Asian equity markets including China are badly affected in the context of liquidity due to Global liquidity crunch started around 2007. A big hump has been observed around 2015 due to devaluation of Yuan that caused rapid selling of stocks in Shenzhen stock exchange and dropped its index by 8.5%.

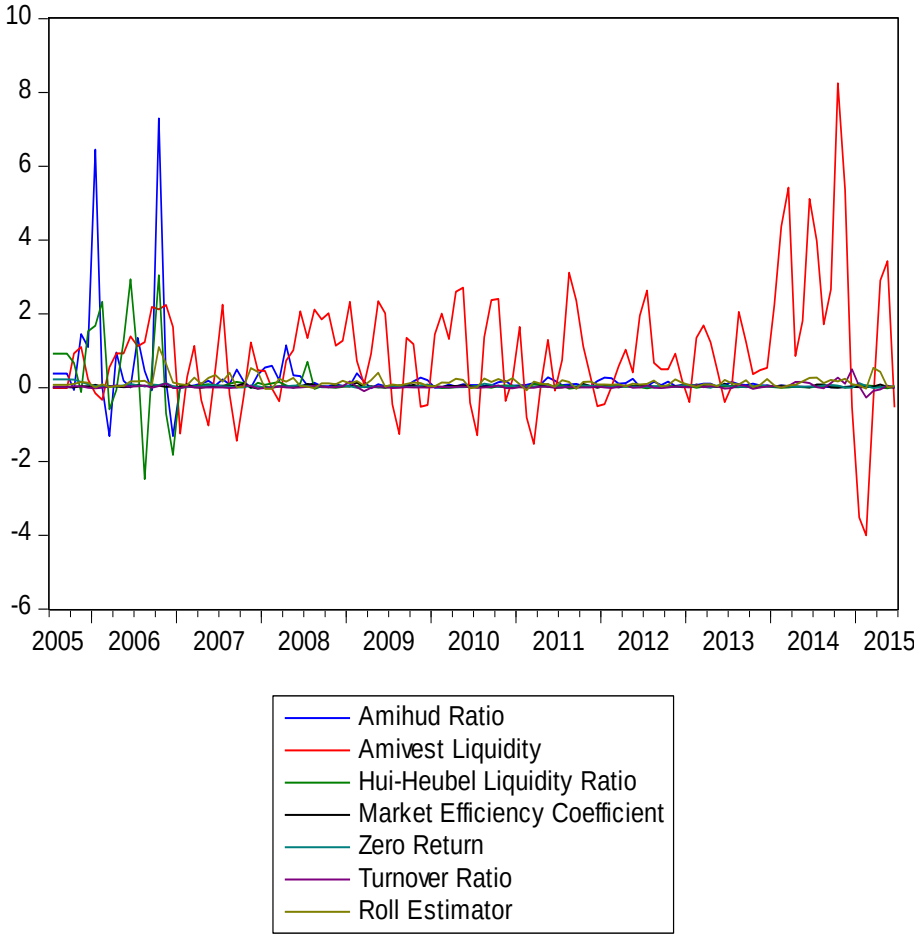

FIGURE 4.24: Market Liquidity.

4.3.5 Betas for Decile Portfolios in China

Average betas for all the portfolios sorted on the basis of illiquidity are calculated and their results are reported in table 4.23. A mixed trend has been observed in all the betas of illiquidity measures in China .Vu et al. (2016) and Lee (2011) observed the same trend in Australia and USA. A significant increase has been seen in β_2, β_4 and β_5 in portfolio 8, 9 and 10 in respect to Amivest liquidity. Similarly a magnificent increase in β_2, β_4 and β_5 has been found in portfolio 10 of illiquidity measure turnover. β_5 and β_6 in portfolio 2 in case of Amihid ratio are relatively less. Overall there is no significant increase or decreasing trend seen in all portfolio betas of illiquidity measures. β_2, β_3 and β_4 have expected signs supporting the LCAPM in China.

TABLE 4.23: Portfolio Betas for illiquidity.

Panel A Amihud Ratio						
Portfolio	β_1	β_2	β_3	β_4	β_5	β_6
(Lowest) 1	0.0135	0.5537	-0.0210	-0.0466	0.6213	0.6348
2	0.0192	0.1599	-0.0350	-0.0115	0.2064	0.2256
3	0.0208	0.3695	-0.0254	-0.0383	0.4332	0.4540
4	0.0225	0.5649	-0.0490	-0.0182	0.6322	0.6546
5	0.0165	0.4108	-0.0407	-0.0091	0.4605	0.4770
6	0.0157	0.5943	-0.0421	-0.0367	0.6731	0.6889
7	0.0179	0.6253	-0.0341	-0.0208	0.6802	0.6981
8	0.0213	0.7236	-0.0386	-0.0443	0.8065	0.8277
9	0.0164	0.8981	-0.0219	-0.0560	0.9760	0.9925
(Highest) 10	0.0196	0.8366	-0.0404	-0.0726	0.9496	0.9692
Panel B Amivest Liquidity						
Portfolio	β_1	β_2	β_3	β_4	β_5	β_6
(Lowest) 1	0.0002	0.2248	-0.0015	-0.0001	0.2264	0.2266
2	0.0003	0.2478	0.0001	0.0007	0.2470	0.2472
3	0.0003	0.3153	-0.0010	0.0010	0.3154	0.3156
4	0.0003	0.3582	-0.0006	-0.0009	0.3597	0.3600
5	0.0002	0.6114	0.0005	-0.0017	0.6126	0.6129
6	0.0003	0.9471	0.0002	-0.0036	0.9505	0.9508
7	0.0002	0.6865	-0.0019	-0.0046	0.6930	0.6933
8	0.0003	1.5378	-0.0013	0.0018	1.5373	1.5376
9	0.0003	2.2137	-0.0006	0.0002	2.2141	2.2144
(Highest) 10	0.0002	2.9794	0.0009	0.0041	2.9744	2.9747
Panel C Hui-Heubel Liquidity Ratio						
Portfolio	β_1	β_2	β_3	β_4	β_5	β_6
(Lowest) 1	0.1337	0.4314	0.0261	0.0014	0.4040	0.5377
2	0.1569	0.4870	0.0137	0.0029	0.4704	0.6273
3	0.1516	0.4145	0.0709	0.0502	0.2934	0.4451
4	0.1317	0.4423	0.0319	0.0240	0.3864	0.5182

5	0.1118	0.4840	0.0346	0.0925	0.3568	0.4687
6	0.1432	0.4424	0.0327	0.0433	0.3665	0.5097
7	0.1351	0.4734	-0.0062	0.0137	0.4658	0.6009
8	0.1241	0.7528	0.0293	0.0463	0.6772	0.8013
9	0.0938	0.6258	0.0509	0.0425	0.5324	0.6262
(Highest) 10	0.1383	0.7316	0.0010	0.0362	0.6943	0.8326
Panel D Zero Return						
Portfolio	β_1	β_2	β_3	β_4	β_5	β_6
(Lowest) 1	0.4008	0.4870	-0.0236	-0.0055	0.5161	0.9169
2	0.4225	0.4005	-0.0235	-0.1281	0.5521	0.9747
3	0.3804	0.4682	-0.0180	-0.0720	0.5581	0.9385
4	0.3640	0.5099	-0.0017	-0.0735	0.5851	0.9491
5	0.4075	0.1824	-0.0118	-0.0914	0.2856	0.6931
6	0.4237	0.4200	-0.0232	-0.0666	0.5097	0.9335
7	0.3984	0.6352	-0.0009	-0.0360	0.6722	1.0706
8	0.2822	0.9238	-0.0016	-0.0532	0.9785	1.2607
9	0.3838	0.5965	-0.0042	-0.0063	0.6070	0.9908
(Highest) 10	0.3956	1.1238	-0.0230	-0.0549	1.2017	1.5973
Panel E Market Efficiency Coefficient						
Portfolio	β_1	β_2	β_3	β_4	β_5	β_6
(Lowest) 1	0.1745	0.4137	-0.1062	-0.1108	0.6307	0.8052
2	0.1670	0.4819	-0.1263	-0.1374	0.7455	0.9126
3	0.1968	0.5911	-0.1521	-0.1618	0.9050	1.1019
4	0.2051	0.6334	-0.1638	-0.1702	0.9674	1.1725
5	0.1871	0.5254	-0.1339	-0.1286	0.7879	0.9749
6	0.1822	0.6638	-0.1015	-0.1203	0.8857	1.0678
7	0.2016	0.5007	-0.1341	-0.1291	0.7639	0.9654
8	0.1886	0.5023	-0.1363	-0.1645	0.8032	0.9918
9	0.1743	0.5703	-0.0999	-0.1363	0.8065	0.9808
(Highest) 10	0.2042	0.7074	-0.1495	-0.1647	1.0217	1.2259

Panel F Turnover						
Portfolio	β_1	β_2	β_3	β_4	β_5	β_6
(Lowest) 1	0.2573	0.1207	-0.0253	-0.1385	0.2845	0.5418
2	0.2139	0.2654	0.0241	-0.0169	0.2582	0.4722
3	0.2335	0.0475	-0.0730	-0.0035	0.1241	0.3576
4	0.2552	0.0680	0.0577	0.0074	0.0029	0.2581
5	0.3079	0.0298	0.0441	-0.0004	-0.0139	0.2940
6	0.3160	0.0907	-0.0236	-0.0242	0.1385	0.4545
7	0.2688	0.0918	-0.0159	-0.0106	0.1183	0.3871
8	0.2061	0.1289	0.0568	-0.0360	0.1080	0.3141
9	0.2515	0.1624	-0.0553	0.0261	0.1916	0.4431
(Highest) 10	0.2890	0.7403	0.1016	-0.0365	0.6753	0.9643
Panel G Roll Estimator						
Portfolio	β_1	β_2	β_3	β_4	β_5	β_6
(Lowest) 1	0.0245	0.2669	-0.0008	-0.0733	0.3410	0.3654
2	0.0265	0.2237	0.0226	-0.0132	0.2142	0.2407
3	0.0291	0.2758	-0.0175	0.0010	0.2924	0.3215
4	0.0296	0.3191	0.0318	-0.0152	0.3024	0.3320
5	0.0217	0.3090	-0.0229	0.0056	0.3263	0.3480
6	0.0308	0.4528	-0.0385	-0.0257	0.5170	0.5478
7	0.0257	0.2788	0.0091	-0.0053	0.2749	0.3007
8	0.0255	0.5331	0.0179	0.0270	0.4882	0.5137
9	0.0302	0.6270	-0.0197	-0.0371	0.6838	0.7140
(Highest) 10	0.0269	0.7960	-0.0304	-0.1019	0.9283	0.9552

4.3.6 Results of Liquidity Adjusted Capital Asset Pricing Model for China

Table 4.24 reports the regression results of Amihud ratio after testing LCAPM specifications.

4.3.6.1 Liquidity Adjusted Capital Asset Pricing Model Based on Amihud Ratio

Statistically negative coefficients of residuals of innovation of Amihud measure (E_c) in all models show that level of illiquidity has a negative impact on excess equity return in China stock exchange during 2005-2015. The result of the study supports unforeseen illiquidity in China stock market. Moreover the result of the study is also consistent with Yahyazadehfar and Khoramdin (2008) who found negative and significant effect of Amihud ratio on equity returns.

All the individual betas β_2, β_3 and β_4 are significant at 1% significance level but opposite signs and contradict with Chordia et al. (2000), Pastor and Stambaugh (2003) and Acharya and Pedersen (2005). Hongxing and Duduchoge (2017) reported significant negative commonality beta β_2 in Ghana stock market and demonstrated the reason that emerging market are usually characterized by asymmetrical of information, lack of transparent information and noise that lead to drop the value of asset dramatically during simultaneous movement of illiquidity shocks in market and stocks and affect the returns badly.

Aggregate betas are significant at 1% significance level with negative coefficients revealing illiquid risk is more in China and accepts fourth and fifth hypotheses that liquidity risks and systematic risks at combined level have been priced in China stock market during 2005-2015.

4.3.6.2 Liquidity Adjusted Capital Asset Pricing Model Based on Amivest Liquidity

LCAPM specifications are tested by employing panel regression with fixed effect in the context of Amivest liquidity and results are reported in a table 4.25. Table shows that liquidity level (E_c) has a significant but negative impact on the excess return of equities demonstrating the presence of high cost per trading volume in Shenzhen stock exchange during 2005-2015. Kumar and Misra (2015) investigated that in emerging market high level of risk for losses along with gains is associated

with high level of illiquidity. The execution of large transaction may bring a significant price change that lead to higher losses and cause negative returns.

TABLE 4.24: Results of LCAPM Based on Amihud Ratio

	Models						
Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Constant	-0.182***	-0.159**	-0.174***	-0.187***	-0.136**	-0.007**	-0.204***
	(-2.75)	(-2.40)	(-2.63)	(-2.83)	(-2.07)	(-2.11)	(-2.94)
E_c	-0.094***	-0.097***	-0.091***	-0.090***	-0.097***	-0.098***	-0.091***
	(-13.17)	(-13.52)	(-12.61)	(-12.44)	(-13.74)	(-13.73)	(-12.78)
1	0.236***	0.108*	0.448***	0.446***	0.197***		0.176*
	-4.08	-1.68	-4.53	-5.1	-3.42		-1.65
2		-0.024***					-0.044***
		(-2.86)					(-4.81)
3			0.098***				-0.461**
			-2.64				(-2.40)
4				0.091***			0.506***
				-3.19			-3.43
5					-0.046***		
					(-4.97)		
6						-0.045***	
						(-4.81)	
Firm Size	0.008***	0.008***	0.007***	0.008***	0.008***	0.002	0.010***
	-2.8	-2.81	-2.67	-2.87	-2.81	-0.95	-3.62
Momentum	-0.069***	-0.060***	-0.076***	-0.079***	-0.060***	-0.047***	-0.074***
	(-6.45)	(-5.43)	(-6.92)	(-7.12)	(-5.67)	(-4.56)	(-6.66)
F-statistics	19.37	18.75	18.63	18.94	20.36	20.04	19.11
F- statistics(p)	0	0	0	0	0	0	0
Adjusted R	0.24	0.25	0.26	0.26	0.27	0.26	0.28

*E_c (liquidity level), β_1 (market risk), β_2 (Commonality beta), β_3 (Flight to liquidity beta), β_4 (Depressed wealth beta), β_5 (Aggregate liquidity beta), β_6 (Systematic risk). * indicate 10% level of significance, ** indicate 5% level of significance and *** indicate 1% level of significance.*

Individual betas β_2, β_3 and β_4 are significant at 1% significance level with expected sign and accept the first second and third hypothesis of the study. Cumulative

betas of liquidity risk and systematic risk (β_5 and β_6) are significant positively at 1% significant level indicating liquidity premium of 7.5% and systematic risk compensation is 6.7% in China stock market during sample period. Therefore result of the study support the fifth and sixth hypotheses of the study that liquidity risks and systematic risks have been priced in Shenzhen stock exchange of China.

TABLE 4.25: Results of LCAPM Based on Amivest Liquidity

	Models						
Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Constant	-0.516***	-0.813***	-0.544***	-0.656***	-0.852***	-0.544***	-1.378***
	(-8.25)	(-8.20)	(-7.53)	(-8.79)	(-8.29)	(-7.29)	(-11.80)
E_c	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001*	-0.001***
	(-3.96)	(-3.53)	(-3.84)	(-3.54)	(-3.45)	(-1.87)	(-2.88)
1	-0.257***	-0.270***	-0.248***	-0.165***	-0.265***		0.636***
	(-7.06)	(-7.45)	(-6.46)	(-3.64)	(-7.36)		-8.79
2		0.068***					0.088***
		-3.84					-4.9
3			-0.479***				0.317***
			-2.77				-12.38
4				-1.783***			-0.296***
				(-3.37)			(-13.59)
5					0.075***		
					-4.09		
6						0.067***	
						-3.52	
Firm Size	0.022***	0.032***	0.023***	0.028***	0.033***	0.030***	0.054***
	-8.89	-8.74	-7.65	-8.89	-8.82	-7.71	-12.54
Momentum	-0.125***	-0.136***	-0.124***	-0.124***	-0.136***	-0.086***	-0.145***
	(-9.42)	(-10.09)	(-9.37)	(-9.37)	(-10.17)	(-7.18)	(-12.14)
F-statistics	10.66	11.14	9.93	10.85	11.31	7.43	14.68
F -statistics(p)	0	0	0	0	0	0	0
Adjusted R	0.15	0.16	0.15	0.16	0.17	0.1	0.3

*E_c (liquidity level), β_1 (market risk), β_2 (Commonality beta), β_3 (Flight to liquidity beta), β_4 (Depressed wealth beta), β_5 (Aggregate liquidity beta), β_6 (Systematic risk). * indicate 10% level*

*of significance, ** indicate 5% level of significance and *** indicate 1% level of significance.*

4.3.6.3 Liquidity Adjusted Capital Asset Pricing Model Based on Hui Heubel Liquidity Ratio

Table 4.26 reports the results of regression of another price impact liquidity measure to test 7 models designed in the context of Liquidity adjusted Capital asset pricing model proposed by Acharya and Pedersen (2005).

TABLE 4.26: Results of LCAPM Based on Hui Heubel Liquidity Ratio

	Models						
Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Constant	-0.460***	-0.716***	-0.532***	-0.484***	-0.596***	-0.491***	-0.657***
	(-6.64)	(-8.20)	(-6.22)	(-5.67)	(-8.45)	(-7.54)	(-7.65)
E_c	0.003	0.043	0.015	0.006	0.025	-0.002	0.057**
	-0.1	-1.48	-0.51	-0.22	-0.91	(-0.08)	-1.96
1	0.022***	0.049***	0.021***	0.021***	0.089***		0.094***
	-3.67	-5.96	-3.58	-3.54	-7.52		-7.99
2		0.030***					0.062***
		-4.71					-5.96
3			0.023				0.237***
			-1.43				-2.98
4				0.007			-0.314***
				-0.49			(-4.52)
5					0.067***		
					-6.51		
6						0.068***	
						-6.5	
Firm Size	0.019***	0.029***	0.022***	0.020***	0.022***	0.018***	0.025***
	-6.64	-8.22	-6.23	-5.67	-7.81	-6.84	-7.15
Momentum	-0.080***	-0.095***	-0.084***	-0.081***	-0.091***	-0.085***	-0.092***
	(-6.67)	(-7.79)	(-6.83)	(-6.61)	(-7.75)	(-7.23)	(-7.72)
F-statistics	6.17	7.48	5.88	5.74	9.09	8.59	9.12
F –statistics(p)	0	0	0	0	0	0	0
Adjusted R	0.08	0.11	0.09	0.09	0.13	0.12	0.15

*E_c (liquidity level), β_1 (market risk), β_2 (Commonality beta), β_3 (Flight to liquidity beta), β_4 (Depressed wealth beta), β_5 (Aggregate liquidity beta), β_6 (Systematic risk). * indicate 10% level of significance, ** indicate 5% level of significance and *** indicate 1% level of significance.*

The residuals of Hui Heubel Liquidity Ratio have no significant effect on excess return in China stock market in a data set covering a period of ten years starting from July 2005 and ends at June 2015. It is observed in emerging markets that liquidity shocks create noises and sudden price change relative to volume trades is minimum. Commonality beta premium in Shenzhen stock exchange is 3% at 1% significance level while other individual betas β_3 and β_4 are insignificant with opposite signs. Combined liquidity risks and aggregate systematic risks are statistically significant and priced in equities of China stock market. The findings of the study accept first, fourth and fifth hypotheses of the study. The statistically insignificant coefficient of firm size shows the absence of the firm size effect on excess returns whereas the momentum effect is strong in the capital market of China during sample period.

4.3.6.4 Liquidity Adjusted Capital Asset Pricing Model Based Zero Return

Table 4.27 shows that variation in excess return is not dependent on increasing level of liquidity of zero return like Pakistan. Vu et al.(2016) used Zero return measure in Australia to test LCAPM specification and found the same results. Alam et al.(2007) conducted a study on an emerging market of Bangladesh in the context of low or negative return and liquidity. They demonstrated that unreliable information, illiquidity and considerable volatility in emerging market forced the rational investors not to invest in equities that lead to deteriorate the excess return or make expected return with level of liquidity negative. Negative statistical coefficients of β_1 at 1% significance level indicate that non transparent information, low liquidity and volatility exist in China stock market during 2005-2015. Individual betas β_3 and β_4 are statistically significant with expected signs and support Pastor and Stambaugh (2003) and Acharya and Pedersen (2005) that return sensitivity to liquidity and liquidity sensitivity to return are significantly

priced in China stock market. This also accept second and third hypothesis of the study. Commonality beta β_2 is also significant at 1% significance level with opposite sign contradict with Chordia et al.(2000) but support Alam et al.(2007). Betas of aggregate level are also significant at 1% significance level providing the evidence for the presence of total liquidity and systematic risks in Shenzhen stock exchange during sample period.

TABLE 4.27: Results of LCAPM Based on Zero Return

	Models						
Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Constant	-0.362***	-0.322***	-0.360***	-0.365***	-0.148**	-0.176***	-0.242***
	(-5.85)	(-5.38)	(-6.02)	(-5.99)	(-2.30)	(-2.65)	(-3.65)
E_c	-0.013	0.016	0.012	0.001	0.022	0.024	0.04
	(-0.47)	-0.6	-0.43	0	-0.82	-0.85	-1.49
1	-0.030***	-0.095***	-0.026***	-0.017***	-0.425***		-0.256***
	(-6.01)	(-9.64)	(-5.37)	(-3.02)	(-8.97)		(-4.32)
2		-0.075***					-0.192***
		(-7.55)					(-2.92)
3			-0.137***				-0.241
			(-6.97)				-1.51
4				-0.108***			0.552***
				(-4.83)			-6.64
5					-0.390***		
					(-8.37)		
6						-0.349***	
						(-7.29)	
Firm Size	0.016***	0.017***	0.016***	0.016***	0.023***	0.022***	0.019***
	-6.05	-6.73	-6.18	-6.09	-8.66	-7.98	-7.15
Momentum	-0.103***	-0.110***	-0.108***	-0.109***	-0.105***	-0.071***	-0.100***
	(-8.16)	(-8.98)	(-8.79)	(-8.68)	(-8.66)	(-6.17)	(-8.36)
F-statistics	8.17	12.26	11.57	9.49	13.34	9.62	14.91
F –statistics(p)	0	0	0	0	0	0	0
Adjusted R	0.11	0.18	0.17	0.14	0.19	0.14	0.23

*E_c (liquidity level), β_1 (market risk), β_2 (Commonality beta), β_3 (Flight to liquidity beta), β_4 (Depressed wealth beta), β_5 (Aggregate liquidity beta), β_6 (Systematic risk). * indicate 10% level of significance, ** indicate 5% level of significance and *** indicate 1% level of significance.*

TABLE 4.28: Results of LCAPM Based on Market Efficiency Coefficient

	Models						
Variable	1	2	3	4	5	6	7
Constant	-0.289***	-0.224***	-0.203***	-0.093**	-0.207***	-0.298***	-0.165*
	(-5.10)	(-2.99)	(-2.42)	(-2.06)	(-3.12)	(-4.79)	-1.67
E_c	-0.231***	-0.234***	-0.234***	-0.235***	-0.227***	-0.235***	-0.211***
	(-12.29)	(-12.37)	(-12.38)	(-12.54)	(-12.01)	(-12.42)	(-11.65)
1	-0.029***	-0.003**	-0.017**	-0.004**	-0.153***		0.257***
	(-2.93)	(-2.15)	(-2.27)	(-2.32)	(-2.86)		-3.02
2		0.013					0.242***
		1.33					-3.23
3			0.03				-1.516***
			1.4				(-6.31)
4				0.063***			1.038***
				-2.89			-8.79
5					-0.100***		
					(-2.35)		
6						0.014***	
						-1.58	
Firm Size	0.013***	0.009***	0.009***	0.005	0.014***	0.012***	-0.003
	-5.27	-2.74	-2.58	1.23	-5.63	-5.04	-0.76
Momentum	-0.068***	-0.062***	-0.061***	-0.054***	-0.073***	-0.054***	-0.067***
	(-5.62)	(-4.73)	(-4.64)	(-4.13)	(-5.95)	(-4.79)	(-5.35)
F-statistics	18.77	17.58	17.6	18.21	17.94	17.92	21.89
F –statistics(p)	0	0	0	0	0	0	0
Adjusted R	0.24	0.24	0.24	0.25	0.25	0.23	0.31

*E_c (liquidity level), β_1 (market risk), β_2 (Commonality beta), β_3 (Flight to liquidity beta), β_4 (Depressed wealth beta), β_5 (Aggregate liquidity beta), β_6 (Systematic risk). * indicate 10% level of significance, ** indicate 5% level of significance and *** indicate 1% level of significance.*

4.3.6.5 Liquidity Adjusted Capital Asset Pricing Model Based on Market Efficiency Coefficient

Panel regression results in table 4.28 show that there is a significant impact on the residuals of innovations of market efficiency coefficients on excess return in China stock exchange at 1% significance level. The negative statistically coefficients of E_c empirically support the excessive short term volatility with increasing level of illiquidity.

Amiram et al. (2016) in their study demonstrate excessive short term volatility causes price rounding, increasing spread and inappropriate price discovery that lead to less or negative return in emerging market.

Among individual betas β_4 is statistically significant with opposite sign while β_2 and β_3 are insignificant at all significance levels in China stock market during sample period in the context of market efficiency.

β_5 and β_6 are statistically significant at 1% significance level support 4^{th} and 5^{th} hypotheses that aggregate liquidity as well as systematic risk is priced in China stock market.

4.3.6.6 Liquidity Adjusted Capital Asset Pricing Model Based on Turnover

Table 4.29 demonstrates the results of Panel regression after testing LCAPM specifications in the perspective of illiquidity measure turnover. Liquidity level (E_c) is statistically significant at 1% significance level and support Damodaran (2016) that stocks with less liquidity have positive excess return.

In Shenzhen stock exchange β_3 and β_4 are statistically significant with expected signs at 1% significance level and accept second and third hypotheses of the study. β_2 is also significant with opposite sign and contradict with Chordia et al. (2000). The negative coefficient of commonality beta indicates poor performance of stocks when there is co-movement between market and stock illiquidity.

Cumulative betas β_5 and β_6 are significant revealing total systematic and liquidity risks are priced in stock market of China. Results of fifth and sixth model show

that 2.1% and 2.2% aggregate premium for liquidity and systematic risk exist in China. Moreover Firm size and momentum are significant that negating the firm size effect and accepting the momentum effect during (2005-2015).

TABLE 4.29: Results of LCAPM Based on Turnover

	Models						
Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Constant	-0.166***	-0.236***	-0.502***	-0.689***	-0.335***	-0.237***	-0.965***
	(-2.52)	(-3.48)	(-5.32)	(-6.93)	(-3.49)	(-2.51)	(-8.68)
E_c	0.049***	0.045***	0.051***	0.049***	0.054***	0.052***	0.038***
	-5.36	-4.86	-5.66	-5.52	-5.76	-5.51	-4.27
1	-0.021***	-0.012**	0.012*	0.015*	-0.011*		-0.033***
	(-3.67)	(-1.97)	-1.65	-1.9	(-1.67)		(-3.22)
2		-0.023***					0.012
		(-3.73)					1.38
3			-0.073***				0.464
			(-4.90)				7.61
4				-0.080***			-0.455
				(-6.86)			-9.22
5					0.021**		
					-2.41		
6						0.022**	
						-2.51	
Firm Size	0.007***	0.011***	0.021***	0.029***	0.013***	0.010***	0.040***
	-2.62	-3.77	-5.38	-6.98	-3.57	-2.69	-8.88
Momentum	-0.083***	-0.102***	-0.109***	-0.123***	-0.084***	-0.066***	-0.133***
	(-6.81)	(-7.78)	(-8.33)	(-9.36)	(-6.91)	(-5.71)	(-10.45)
F-statistics	8.23	8.77	9.6	11.5	8.11	7.06	14.72
F –statistics(p)	0	0	0	0	0	0	0
Adjusted R	0.11	0.13	0.14	0.16	0.12	0.1	0.23

*E_c (liquidity level), β_1 (market risk), β_2 (Commonality beta), β_3 (Flight to liquidity beta), β_4 (Depressed wealth beta), β_5 (Aggregate liquidity beta), β_6 (Systematic risk). * indicate 10% level of significance, ** indicate 5% level of significance and *** indicate 1% level of significance.*

4.3.6.7 Liquidity Adjusted Capital Asset Pricing Model Based on Roll Estimator

Panel regression is employed to test the LCAPM specifications in the perspective of Roll estimator and results are reported in table 4.30. Regression coefficients of E_c are statistically insignificant indicating that level of illiquidity has no effect on equity return.

TABLE 4.30: Results of LCAPM Based on Roll Estimator

	Models						
Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Constant	-0.332***	-0.349***	-0.317***	-0.416***	-0.332***	-0.319***	-0.707***
	(-4.94)	(-5.24)	(-4.72)	(-6.05)	(-4.96)	(-5.05)	(-7.46)
E_c	0.003	0.004	0.005	0.006	0.002	0.002	0.002
	0.38	0.58	0.71	0.85	0.33	0.31	0.29
1	0.019**	0.068**	0.056***	0.104*	0.004**		0.029**
	-2.34	-2.12	-2.88	-1.68	-2.07		-2.45
2		-0.064***					0.012
		(-3.65)					0.5
3			-0.015**				-0.774***
			(-2.41)				(-4.57)
4				-0.023***			-0.841***
				(-4.53)			(-5.35)
5					-0.043*		
					(-1.89)		
6						-0.036*	
						(-1.82)	
Firm Size	0.014***	0.017***	0.013***	0.018***	0.016***	0.015***	0.029***
	-4.99	-5.91	-4.78	-6.11	-5.34	-5.66	-7.72
Momentum	-0.070***	-0.080***	-0.071***	-0.085***	-0.073***	-0.071***	-0.113***
	(-5.86)	(-6.60)	(-6.01)	(-6.95)	(-6.10)	(-6.15)	(-8.39)
F-statistics	4.76	5.44	4.86	6	4.69	5.02	6.75
F-statistics(p)	0	0	0	0	0	0	0
Adjusted R	0.08	0.09	0.07	0.09	0.07	0.07	0.11

*E_c (liquidity level), β_1 (market risk), β_2 (Commonality beta), β_3 (Flight to liquidity beta), β_4 (Depressed wealth beta), β_5 (Aggregate liquidity beta), β_6 (Systematic risk). * indicate 10% level of significance, ** indicate 5% level of significance and *** indicate 1% level of significance.*

This supports that transaction cost affects the volume but has no significant impact on returns. β_3 and β_4 are statistically negative that support Pastor and Stambaugh (2003) and Acharya and Pedersen (2005). The finding of the study supports second and third hypothesis of study that investors are willing to accept low return of 1.5% and 2.3% in case of flight to liquidity and depressed wealth effect. Commonality β_2 is also significant with opposite sign at 1% significance level and contradict with Chordia et al.(2000). β_5 and β_6 are significant demonstrating the pricing of liquidity and systematic risks in Shenzhen stock exchange after controlling market risk, momentum and firm size during the sample period of 10 years.

4.4 Statistical Analysis of India

4.4.1 Descriptive Statistics of stock Returns and Illiquidity Proxies

Table 4.31 shows average return in Indian stock market is 0.59%. Roll estimator has the highest value 9.29 among the liquidity measures indicating transaction cost exist in Indian stock market. Turnover on average is 0.15% which is lowest among all illiquidity measures. As far as standard deviation is considered it is less than mean in majority of illiquidity measures including Amivest liquidity,Hui-Heubel liquidity ratio, market efficiency coefficient, zero return and Roll estimator. It observes less fluctuation of liquidity from mean and risk of loss is low when the market is illiquid. All liquidity measures show positive skewness indicating distributions are rightly skewed and frequent decline in liquidity exist in Indian stock market. Leptokurtic distribution of all liquidity measures show the probability of extreme values in the data set during 2005-2015 in National stock exchange of India.

TABLE 4.31: Descriptive Statistics of Illiquidity Proxies and Equity Returns

Variables	Amihud Measure (AM)	Amivest Liquidity (AL)	Hui-Heubel Liquidity Ratio (HHLR)	Market Efficiency Coefficient (MEC)	Zero Return (ZR)	Turnover Ratio (TR)	Roll Estimator (RE)	Stock Returns (Ri)
Mean	0.0034	0.0657	2.5577	0.0568	0.0175	0.0015	9.2919	0.0059
Median	0.0016	0.0574	1.6502	0.0516	0.0140	0.0009	6.9937	0.0050
Maximum	0.0305	0.2596	12.8890	0.1491	0.0633	0.0186	39.2732	0.0509
Minimum	0.0002	0.0318	0.2224	0.0222	0.0000	0.0002	1.6747	-0.0325
Std. Dev.	0.0053	0.0313	2.2749	0.0225	0.0138	0.0021	6.5193	0.0146
Skewness	3.1031	2.7189	1.8540	1.6523	1.0243	5.0775	2.4126	0.5117
Kurtosis	13.3346	14.7978	6.7987	6.6558	3.5971	37.0081	9.6006	5.0369
Observations	9600	9600	9600	9600	9600	9600	9600	9600

4.4.2 Correlation Matrix of Illiquidity Proxies

Table 4.32 reveals the correlation of all liquidity measures. A strong positive association (0.71) has been observed in Amivest liquidity and turnover ratio. This supports the relationship between price and volume and reflects dissemination of information flow in stock exchange Tapa and Hussin (2016). High price volatility accompanied by low volume representing illiquid market.

Another strong positive association (0.54) has been observed between Hui-Heubel liquidity ratio and Roll estimator that show the relationship between transaction cost, price volatility and turnover. Low transaction cost may increase the trading volume and enhance the liquidity that leads to increase the price of assets Westerholm and Swan (2001). Zero return is negatively related to Amihud measure, Amivest liquidity, market efficiency coefficient and turnover ratio in Indian stock market during 2005-2015.

TABLE 4.32: Correlation Matrix of Illiquidity Proxies.

Variables	**Amihud Measure (AM)**	**Amivest Liquidity (AL)**	**Hui-Heubel Liquidity Ratio (HHLR)**	**Market Efficiency Coefficient (MEC)**	**Zero Return (ZR)**	**Turnover Ratio (TR)**	**Roll Estimator (RE)**
Amihud Measure (AM)	1	-0.0713	0.1364	0.1267	-0.2676	0.0566	-0.1485
Amivest Liquidity (AL)	-0.0713	1	-0.2127	0.0363	-0.3537	0.7120	-0.1810
Hui-Heubel Liquidity Ratio (HHLR)	0.1364	-0.2127	1	0.2269	0.2490	-0.1439	0.5381
Market Efficiency Coefficient (MEC)	0.1267	0.0363	0.2269	1	-0.0471	0.0616	0.0901
Zero Return (ZR)	-0.2676	-0.3537	0.2490	-0.0471	1	-0.2727	0.3141
Turnover Ratio (TR)	0.0566	0.7120	-0.1439	0.0616	-0.2727	1	-0.1242
Roll Estimator (RE)	-0.1485	-0.1810	0.5381	0.0901	0.3141	-0.1242	1

4.4.3 Innovations in Illiquidity Measures

The innovation in illiquidity measures are computed by taking equally weighted average of residuals of each illiquidity measure. The graphic representation of innovations in illiquidity measure including Amivest liquidity and turnover indicates fewer variations during 2005-2015. The rest of the illiquidity cost measures have variations during the time frame of ten years in Indian stock market.

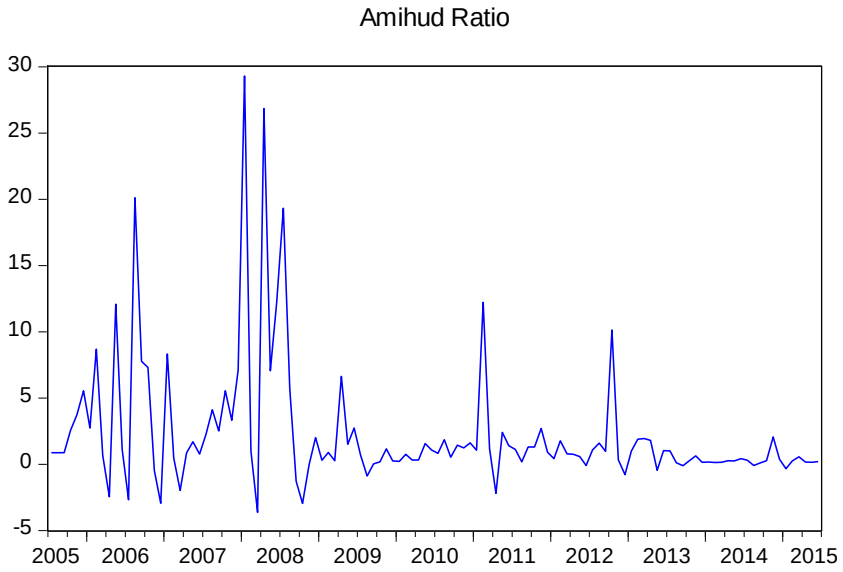

FIGURE 4.25: Innovations in Amihud Ratio.

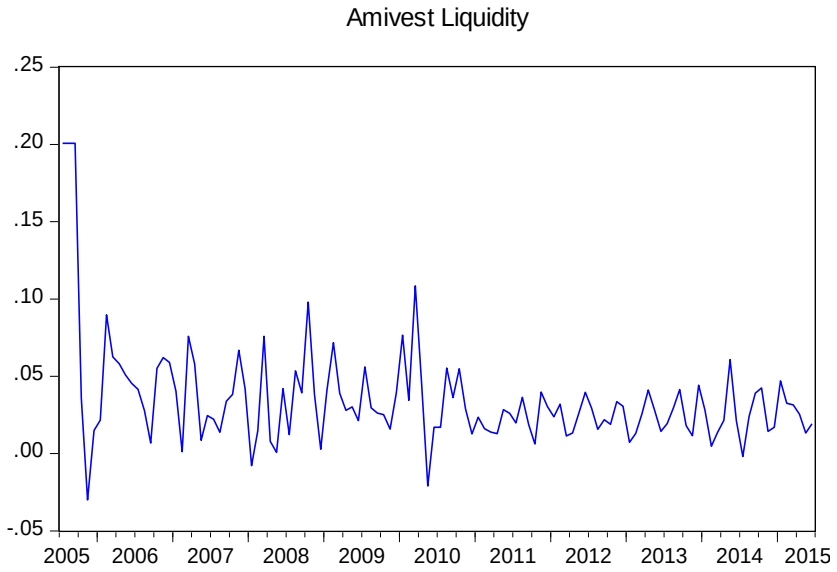

FIGURE 4.26: Innovations in Amivest Liquidity.

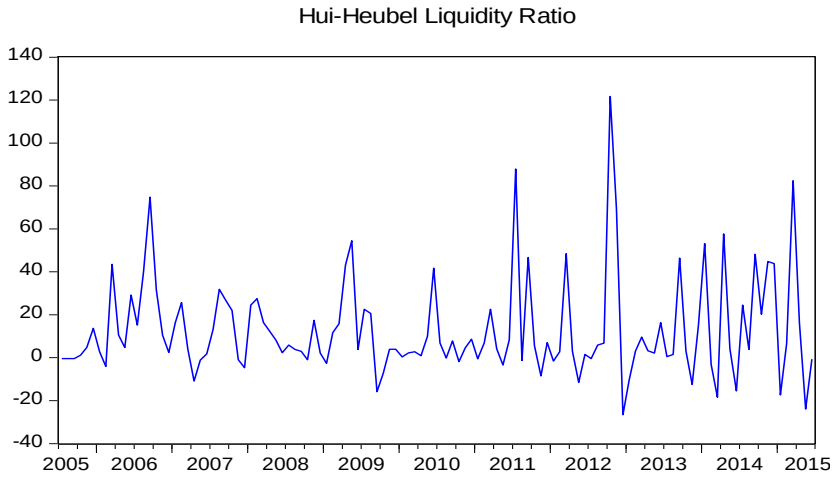

FIGURE 4.27: Innovations in Hui-Heubel Liquidity Ratio.

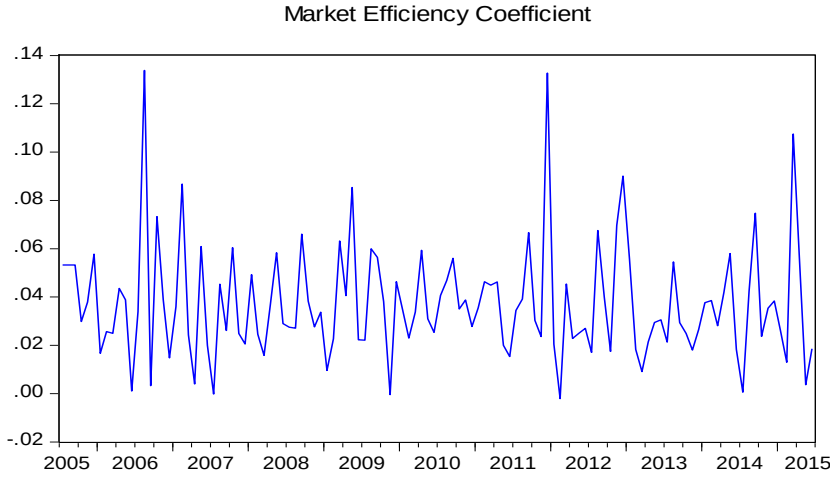

FIGURE 4.28: Innovations in Market Efficiency Coefficient.

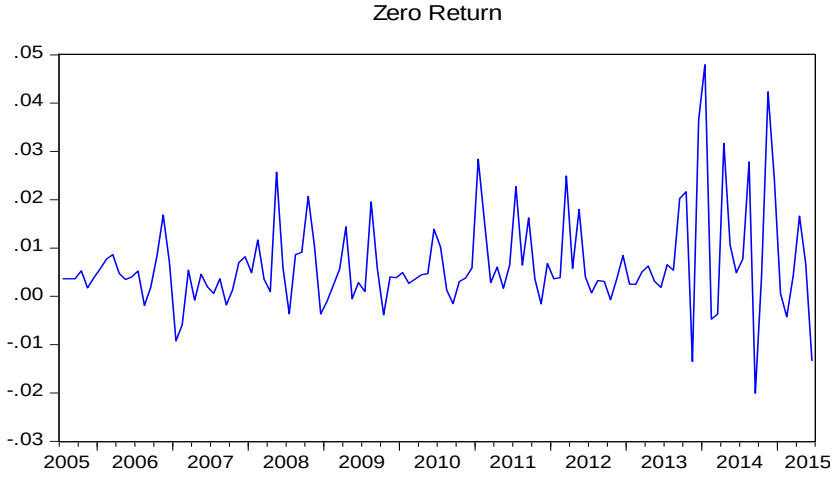

FIGURE 4.29: Innovations in Zero Return.

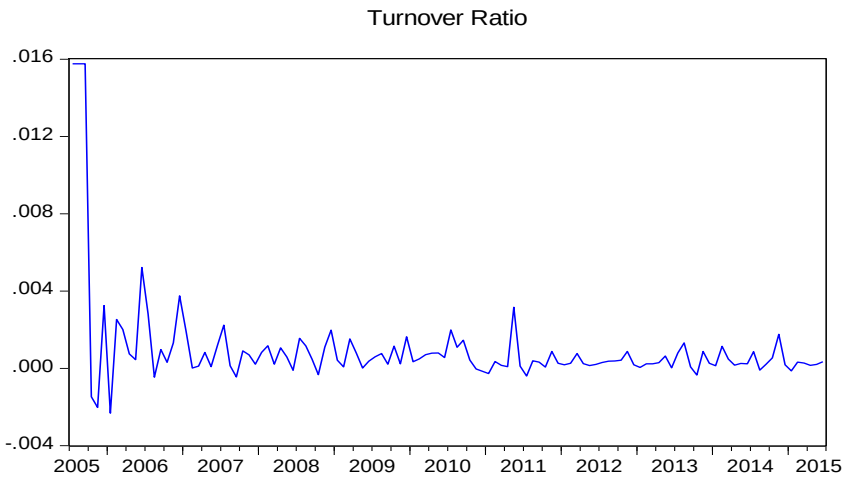

FIGURE 4.30: Innovations in Turnover Ratio.

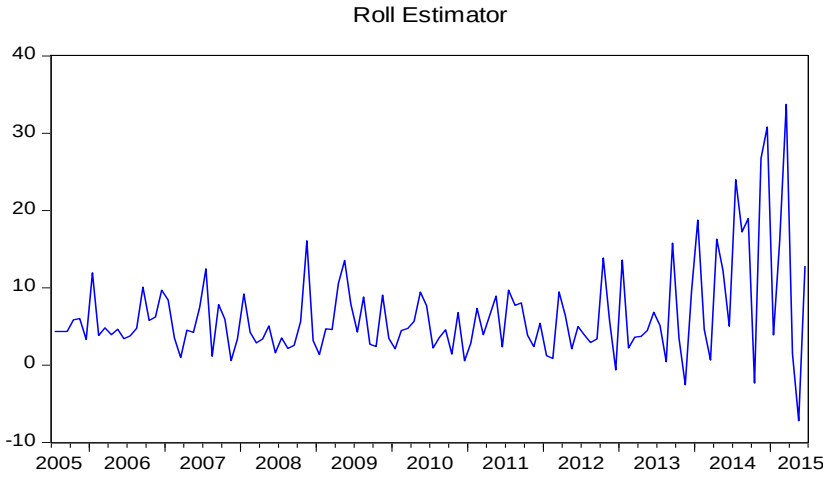

FIGURE 4.31: Innovations in Roll Estimator.

4.4.4 Market Liquidity

A series of humps or spikes of market liquidity has been seen in National stock exchange of India during 2005-2015. The hump of (2006-2007) coincides with housing bubble due to subprime losses and affected global financial markets. This affected the NIFTY index as well and the index fall by 8.70% in reaction to it. An upward spike around (2008-2009) indicate the effect of global financial crises and fear of U.S recession reported fall in Nifty index by 310 points. In 2011 the events Indian rupees devaluation, Hike in RBI,s rate and 2G scam affected the liquidity of Indian stock exchange.

Further devaluation of Indian rupee against dollar due to passing of Lok Sabha has

put the downward pressure on the liquidity of Indian stock market in (2012-2013). MSCI index measure the performance of Indian stock exchange -20% among worst performing emerging markets. In (2014-2015) Modi became prime minister and the fear of slumping crude prices and fear of more devaluation of Indian rupees made the performance of blue chip companies in index miserable. Moreover the spreading of news about the Greece for leaving the currency union of European brought illiquidity crises in Indian stock market.

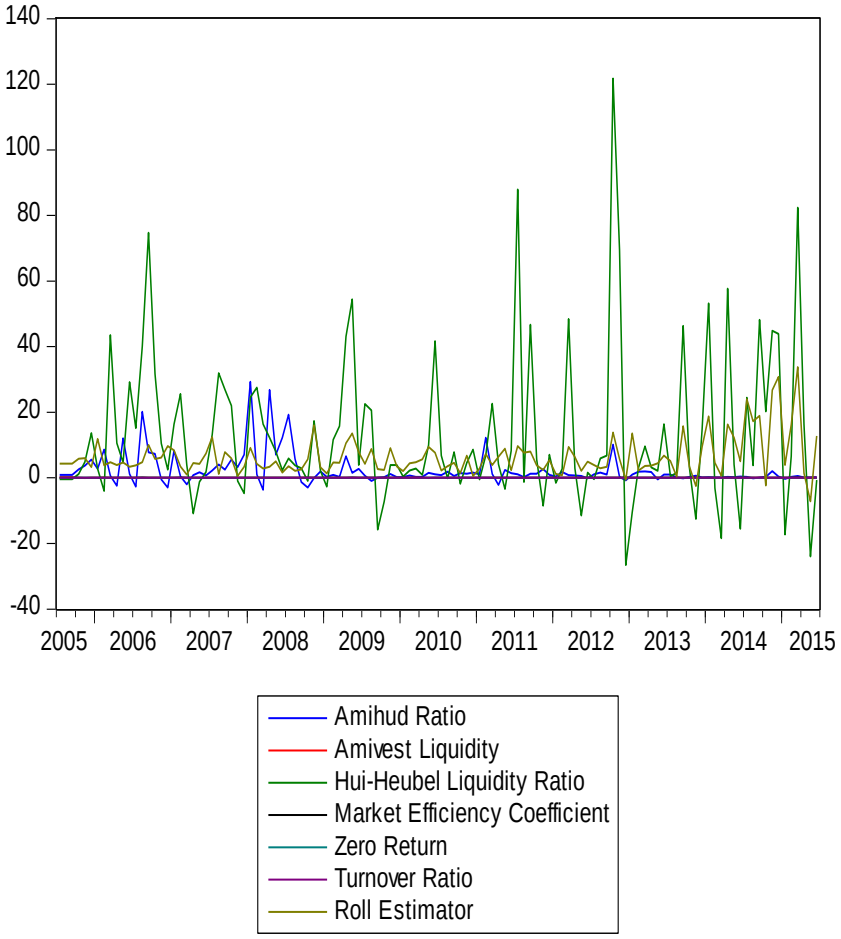

FIGURE 4.32: Market Liquidity.

4.4.5 Betas for Decile Portfolios in India

All the portfolios betas β_1, β_2, β_3, β_4, β_5 and β_6 of each illiquidity measure are showing the mixed trend in consistent with the studies Lee (2011), Vu et al. (2015) and Kim and Lee (2014) conducted in developed markets. The magnificent

increase or decrease in betas has not been observed in Amihud ratio, Amivest liquidity, Hui-Heubel liquidity ratio, turn over and Roll estimator. 7^{th} and 5^{th} portfolios of zero return and market efficiency ratio show a drastic increase in all betas relative to other portfolios. Results show positive signs of β_2 in all illiquidity measures and negative sign of β_3 and β_4 in most of the cases. The significance of betas with the expected sign would support LCAPM model in Indian stock market during 2005-2015.

TABLE 4.33: Portfolio Betas for illiquidity.

Panel A Amihud Ratio						
Portfolio	β_1	β_2	β_3	β_4	β_5	β_6
(Lowest) 1	0.0001	-0.0150	0.0009	0.0002	-0.0161	-0.0160
2	0.0004	0.0231	0.0010	-0.0001	0.0222	0.0226
3	0.0001	0.0157	0.0004	-0.0001	0.0154	0.0155
4	0.0007	-0.0060	-0.0006	-0.0002	-0.0052	-0.0045
5	0.0007	-0.0106	0.0002	-0.0008	-0.0101	-0.0094
6	0.0002	0.0285	-0.0012	-0.0002	0.0300	0.0301
7	0.0008	0.0208	0.0003	-0.0002	0.0207	0.0215
8	0.0003	0.0212	-0.0076	-0.0052	0.0339	0.0342
9	0.0001	0.0172	-0.0004	0.0003	0.0174	0.0175
(Highest) 10	0.0006	0.0723	0.0058	0.0034	0.0630	0.0636
Panel B Amivest Liquidity						
Portfolio	β_1	β_2	β_3	β_4	β_5	β_6
(Lowest) 1	0.5757	0.1982	-0.0159	-0.0582	0.2722	0.8479
2	0.5801	0.1786	-0.0476	-0.0082	0.2343	0.8144
3	0.4444	0.1714	-0.0794	-0.0098	0.2607	0.7050
4	0.5985	0.1473	-0.0290	-0.0350	0.2113	0.8097
5	0.4863	0.1724	-0.0435	-0.0423	0.2582	0.7444
6	0.5305	0.2893	-0.0902	-0.0647	0.4441	0.9747
7	0.4737	0.3428	-0.0442	-0.0235	0.4105	0.8842
8	0.4219	0.4449	-0.0520	-0.0678	0.5647	0.9866
9	0.5059	0.4107	-0.0361	-0.0524	0.4992	1.0051

(Highest) 10	0.5957	0.5152	-0.0540	-0.0457	0.6149	1.2107
Panel C Hui Heubel Liquidity Ratio						
Portfolio	β_1	β_2	β_3	β_4	β_5	β_6
(Lowest) 1	0.0003	0.0032	0.0006	-0.0006	0.0033	0.0036
2	0.0001	0.0041	-0.0005	-0.0006	0.0052	0.0053
3	0.0002	0.0036	-0.0003	0.0008	0.0031	0.0033
4	0.0003	0.0041	0.0004	-0.0009	0.0047	0.0049
5	0.0004	0.0078	0.0001	-0.0003	0.0079	0.0084
6	0.0004	0.0073	-0.0006	0.0002	0.0077	0.0081
7	0.0004	0.0057	0.0003	0.0007	0.0047	0.0051
8	0.0003	0.0063	0.0003	-0.0005	0.0064	0.0067
9	0.0003	0.0095	-0.0001	0.0008	0.0088	0.0091
(Highest) 10	0.0003	0.0097	-0.0005	-0.0006	0.0108	0.0111
Panel D Zero Return						
Portfolio	β_1	β_2	β_3	β_4	β_5	β_6
(Lowest) 1	0.3064	0.0013	-0.0421	-0.0322	0.0756	0.3820
2	0.3696	0.0354	0.0566	-0.0079	-0.0132	0.3564
3	0.4167	0.0225	-0.0625	0.0307	0.0543	0.4710
4	0.3062	0.0178	-0.0645	-0.0012	0.0835	0.3897
5	0.2450	0.0233	0.0743	0.0011	-0.0520	0.1930
6	0.5460	0.1317	0.0485	-0.0298	0.1130	0.6590
7	0.9406	0.3990	-0.0401	0.1376	0.3015	1.2422
8	0.9888	0.4985	-0.0186	-0.1254	0.6424	1.6312
9	0.3107	0.4305	0.0749	0.0692	0.2864	0.5971
(Highest) 10	0.4046	0.5269	-0.0491	-0.0598	0.6358	1.0404
Panel E Market Efficiency Coefficient						
Portfolio	β_1	β_2	β_3	β_4	β_5	β_6
(Lowest) 1	0.2627	1.1279	0.0308	0.1227	0.9743	1.2371
2	0.2787	0.5038	-0.0513	0.0477	0.5074	0.7861
3	0.1682	0.8325	0.0836	-0.0052	0.7540	0.9222
4	0.2567	0.9695	0.1314	0.2032	0.6350	0.8917

5	0.6370	0.7529	-0.0889	-0.0920	0.9338	1.5708
6	0.1417	0.5791	0.0874	-0.0524	0.5441	0.6858
7	0.4899	0.8083	-0.0050	0.0091	0.8042	1.2940
8	0.1264	0.8416	0.0810	0.1024	0.6582	0.7847
9	0.1684	0.9487	0.0526	0.1119	0.7842	0.9526
(Highest) 10	0.3514	0.8793	-0.0368	-0.1096	1.0257	1.3771
Panel F Turnover Ratio						
Portfolio	β_1	β_2	β_3	β_4	β_5	β_6
(Lowest) 1	0.3130	0.0004	-0.0217	-0.0019	0.0240	0.3370
2	0.4892	0.0001	-0.0033	-0.0004	0.0038	0.4930
3	0.3423	0.0007	0.0013	0.0017	-0.0022	0.3401
4	0.5255	0.0006	0.0026	-0.0017	-0.0003	0.5252
5	0.3778	0.0001	-0.0004	0.0019	-0.0014	0.3764
6	0.7706	0.0002	0.0043	0.0009	-0.0050	0.7655
7	0.4247	0.0008	0.0030	-0.0020	-0.0002	0.4246
8	0.5617	0.0002	-0.0038	-0.0008	0.0047	0.5664
9	0.4746	0.0021	-0.0121	-0.0022	0.0163	0.4909
(Highest) 10	0.5437	0.0025	-0.0013	-0.0603	0.0641	0.6078
Panel G Roll Estimator						
Portfolio	β_1	β_2	β_3	β_4	β_5	β_6
(Lowest) 1	0.0008	0.7943	0.0003	0.0003	0.7937	0.7945
2	0.0009	0.7673	0.0011	0.0010	0.7652	0.7661
3	0.0008	0.8866	-0.0001	-0.0001	0.8868	0.8876
4	0.0004	0.9256	0.0009	0.0044	0.9202	0.9206
5	0.0002	0.4160	0.0004	-0.0026	0.4182	0.4184
6	0.0003	0.4222	0.0014	-0.0009	0.4217	0.4219
7	0.0006	0.4794	0.0003	0.0008	0.4783	0.4790
8	0.0009	0.6344	0.0006	0.0010	0.6328	0.6336
9	0.0008	0.3105	0.0006	-0.0014	0.3113	0.3121
(Highest) 10	0.0002	0.7914	0.0004	0.0012	0.7897	0.7900

4.4.6 Results of Liquidity Adjusted Capital Asset Pricing Model for India

Table 4.34 reports the seven LCAPM models result after employing Panel regression in respect of illiquidity measure Amihud ratio. The liquidity level (E_c) is statistically negatively significant at 1% significance level indicating Amihud ratio negatively affects the excess return.

TABLE 4.34: Results of LCAPM Based on Amihud Ratio

	Models						
Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Constant	0.126**	0.037***	0.365***	0.374***	0.007**	-0.202***	0.244***
	-2.31	-2.65	-4.9	-4.93	-2.12	(-4.30)	-2.74
E_c	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001**	-0.001***
	(-2.58)	(-2.86)	(-3.17)	(-3.23)	(-2.77)	(-2.48)	(-3.38)
1	0.315***	0.332***	0.464***	0.481***	0.311***		0.502***
	-5.48	-5.86	-7.11	-7.17	-5.48		-5.64
2		0.125***					0.100***
		-4.83					-3.33
3			0.186***				-0.174
			-4.61				(-1.09)
4				0.180***			0.183
				-4.63			-1.27
5					0.122***		
					-4.43		
6						0.124***	
						-4.43	
Firm Size	-0.005**	-0.006***	-0.014***	-0.014***	-0.005**	0.003**	-0.013***
	(-2.39)	(-2.98)	(-4.94)	(-4.98)	(-2.38)	-2.15	(-4.26)
Momentum	0.003	-0.018	-0.008	-0.01	-0.016	-0.019	-0.027*
	-0.26	(-1.37)	(-0.68)	(-0.78)	(-1.20)	(-1.45)	(-1.90)
F-statistics	3.3	4.83	4.67	4.68	4.55	2.49	4.84
F-statistics(p)	0	0	0	0	0	0	0
Adjusted R	0.06	0.07	0.07	0.07	0.06	0.05	0.08

*E_c (liquidity level), β_1 (market risk), β_2 (Commonality beta), β_3 (Flight to liquidity beta), β_4 (Depressed wealth beta), β_5 (Aggregate liquidity beta), β_6 (Systematic risk). * indicate 10% level of significance, ** indicate 5% level of significance and *** indicate 1% level of significance.*

4.4.6.1 Liquidity Adjusted Capital Asset Pricing Model Based on Amihud Ratio

The negative coefficients of Amihud ratio indicate unexpected illiquidity in Indian stock market that lowers the contemporaneous return. Individually, commonality β_2 is statistically significant at 1% significance level with expected sign support the Chordia et al. (2000) and accept the first hypothesis of study. Dunne et al.(2011) also found pricing of commonality beta in a developed market. Other individual betas β_3 and β_4 are also significant with opposite sign. Grunditz and Hardig (2012) demonstrated that impact of liquidity in emerging market is more as compared to developed market. Therefore it is a common observation in developing market that higher realized unexpected illiquidity generates expected illiquidity that in turn raises stock excess return over the time. Aggregate betas β_5 and β_6 are also significant at 1% significance level demonstrating 12.1% and 12.4% total liquidity and systematic premium exist in stock market of India during 2005-2015. The result of study accepts the four and fifth hypotheses of the study.

4.4.6.2 Liquidity Adjusted Capital Asset Pricing Model Based on Amivest Liquidity

Regression results of LCAPM specifications in the context of liquidity measure Amivest liquidity are reported in table 4.35. In india the coefficient of E_c is negative and significant at 1% significance level just like Amihud ratio demonstrating the traces of unexpected liquidity during 2005-2015.

Regression 2 reveals that commonality beta at individual level is statistically significant at 1% significance level but carries the opposite sign and contradict with Chordia et al.(2000). Regressions 3 to 4 describe return sensitivity to liquidity beta (β_3) and liquidity sensitivity to return beta (β_4) are statistically negatively

significant and support Pastor and Stambaugh (2003) and Acharya and Pedersen (2005). The negative coefficients of individual betas β_3 and β_4 accept second and third hypotheses of the study.

TABLE 4.35: Results of LCAPM Based on Amivest Liquidity

	Models						
Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Constant	-0.095**	0.009**	-0.004***	-0.004**	-0.029*	-0.033**	-0.013***
	(-2.29)	-2.17	(-2.78)	(-2.51)	(-1.82)	(-2.37)	(-2.79)
E_c	-0.051**	-0.045*	-0.043*	-0.045**	-0.050**	-0.050**	-0.044*
	(-2.21)	(-1.93)	(-1.86)	(-1.96)	(-2.17)	(-2.16)	(-1.88)
1	0.007*	0.002**	0.013***	0.013***	0.031**		0.021**
	-1.73	-2.36	-2.89	-2.92	-2.09		-2.4
2		-0.014***					0.010**
		(-2.97)					-2.56
3			-0.029***				-0.024
			(-3.20)				-0.4
4				-0.026***			-0.022
				(-3.21)			-0.43
5					0.029*		
					-1.68		
6						0.033**	
						-2.36	
Firm Size	0.004**	0	-0.001	-0.001	0.003	0.003	-0.002
	-2.23	-0.24	(-0.40)	(-0.40)	-1.5	-1.4	(-0.75)
Momentum	-0.001	-0.019	-0.017	-0.017	0	0.001	-0.028
	(-0.07)	(-1.30)	(-1.23)	(-1.23)	(-0.04)	-0.09	(-1.63)
F-statistics	2.3	2.25	2.23	2.32	2.02	2.01	1.96
F-statistics(p)	0	0	0	0	0	0	0
Adjusted R	0.04	0.05	0.03	0.03	0.03	0.05	0.03

*E_c (liquidity level), β_1 (market risk), β_2 (Commonality beta), β_3 (Flight to liquidity beta), β_4 (Depressed wealth beta), β_5 (Aggregate liquidity beta), β_6 (Systematic risk). * indicate 10% level of significance, ** indicate 5% level of significance and *** indicate 1% level of significance.*

Regressions at aggregate level after controlling market risk, momentum and firm size support the fourth and fifth hypotheses that combined liquidity risks and total systematic risks are priced in National stock exchange of India during the whole sample period.

Firm size and momentum is not significant in Indian stock market revealing that there exist no firm size anomaly and effect of past returns of 12 months on excess returns in this financial market.

4.4.6.3 Liquidity Adjusted Capital Asset Pricing Model Based on Hui-Heubel Liquidity Ratio

Table 4.36 describes the regression results of Hui-Heubel liquidity ratio to examine the LCAPM specifications. The liquidity level (E_c) in case of Hui-Heubel liquidity ratio is positive and statistically significant at 1% significance level. The positive coefficients of E_c support the positive relationship between illiquidity cost and expected return.

Commonality beta like Amivest liquidity is statistically significant but has opposite sign at individual level. In the context of Hui-Heubel liquidity ratio liquidity sensitivity to return beta (β_4) is also significant with opposite sign at 1% significance level. Therefore the sign of β_2 and β_4 contradict with Chordia et al.(2000) and Acharya and Pedersen (2005) in National stock exchange of India during 2005-2015.

Moreover return sensitivity to liquidity β_3 is insignificant in model 3 and rejects the second hypothesis of the study that low returns are being accepted by investors for the liquid stocks in illiquid market conditions.

Cheriyan and Lazer (2017) found the same result about β_3 in Indian stock market using high frequency measure quoted spread.

Aggregate betas are significant but negative revealing liquidity risks and systematic risks are priced in Indian stock markets and illiquid risk is more as compared to market risk.

Firm size and other controlling variable are found to be insignificant indicating there is no momentum as well as firm size effect exist in Indian financial market during the whole sample period.

TABLE 4.36: Results of LCAPM Based on Hui-Heubel Liquidity Ratio

	Models						
Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Constant	-0.039***	-0.108*	-0.040*	-0.054**	-0.108*	-0.149***	-0.087*
	(-2.70)	-1.82	-1.72	-1.99	-1.83	-3.48	-1.78
E_c	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
	-4.42	-3.97	-4.38	-4.03	-3.97	-4.02	-3.46
1	-0.157*	0.113*	-0.208*	-0.529**	-0.113*		0.125*
	(-1.67)	(-1.71)	(-1.84)	-2.28	(-1.91)		-1.66
2		-0.069***					-0.007
		(-3.03)					-0.29
3			0.715				-0.119***
			0.62				(-4.33)
4				0.370***			0.137***
				-3.37			-5.23
5					-0.069***		
					(-3.04)		
6						-0.072***	
						(-3.20)	
Firm Size	0.001	0.007**	0.001	0.002	0.007**	0.008***	0.004
	-0.7	-2.49	-0.7	-0.92	-2.5	-3.92	-1.34
Momentum	-0.001	-0.012	-0.002	-0.019	-0.012	-0.011	-0.053***
	(-0.05)	(-0.96)	(-0.13)	(-1.44)	(-0.97)	(-0.89)	(-3.68)
F-statistics	2.37	2.88	2.22	3.04	2.88	3.03	4.39
F-statistics(p)	0	0	0	0	0	0	0
Adjusted R	0.04	0.05	0.05	0.04	0.04	0.05	0.07

*E_c (liquidity level), β_1 (market risk), β_2 (Commonality beta), β_3 (Flight to liquidity beta), β_4 (Depressed wealth beta), β_5 (Aggregate liquidity beta), β_6 (Systematic risk). * indicate 10% level of significance, ** indicate 5% level of significance and *** indicate 1% level of significance.*

4.4.6.4 Liquidity Adjusted Capital Asset Pricing Model Based on Zero Return

Table 4.37 indicates the regression results of LCAPM specifications with respect to price impact measure of liquidity zero return. Insignificant coefficients of residuals of illiquidity cost (E_c) show that illiquidity cost; zero return have no effect on excess equity returns. Papavassiliou (2013) found liquidity level is not relevant in asset pricing in Greek stock market. Among liquidity betas at individual level only β_2 is statistically significant at 1% significance level with expected signs while remaining liquidity betas β_3 and β_4 have positive significant coefficient and contradict with Pastor and Stambaugh (2003) and Acharya and Pedersen (2005). Papavassiliou (2013) found positive β_4 in a developed market as well. In Indian stock market commonality premium of 2.2% exist in the case of illiquidity measure zero return during 2005-2015. After controlling market risk, firm size and momentum cumulative systematic and liquidity risks β_5 and β_6 betas are statistically significant and accept the fourth and fifth hypotheses of the study.

4.4.6.5 Liquidity Adjusted Capital Asset Pricing Model Based on Market Efficiency Coefficient

The seven specifications of LCAPM model in the context of market efficiency coefficient have been tested through panel regression with fixed effects and results are compiled in table 4.38. Just like residuals of zero return E_c of market efficiency coefficient are insignificant indicating no relationship between excess return and market efficiency coefficient. Kumar and Misra (2015) demonstrated that in emerging markets new information create noise and cause asymmetry in information therefore information are not adjusted in price that lead to minimum change in prices.

Among individual liquidity betas β_3 is insignificant and reject second hypothesis that investor does not compromise today's return for the future return in Indian stock exchange during 2005-2015. Moreover commonality premium of 2.1% exist in the financial market of India. β_4 is also significant with opposite sign that

contradict with Acharya and Pedersen (2005). Dunne et al.(2011) found positive β_4 in their study. β_5 and β_6 are significant at 10% significance level that confirms the existence of total liquidity and systematic premium of 2.9% and 1.6% in National stock exchange of India.

TABLE 4.37: Results of LCAPM Based on Zero Return

	Models						
Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Constant	-0.396***	-0.247***	-0.198**	-0.084***	-0.205**	0.064***	-0.175*
	(-4.78)	(-2.70)	(-2.05)	(-2.86)	(-2.13)	-2.78	(-1.67)
E_c	0.042	0.03	0.03	0.027	0.051	0.069	0.043
	-1.04	-0.75	-0.74	-0.67	-1.26	-1.68	-1.13
1	0.027***	0.040***	0.018***	0.013*	-0.085***		0.231***
	-4.06	-5.35	-2.64	-1.95	(-2.83)		-4.03
2		0.022***					0.244***
		-3.66					-3.94
3			0.048***				-1.084***
			-3.94				(-6.21)
4				0.077***			0.766***
				-5.57			-9.28
5					-0.120***		
					(-3.81)		
6						-0.071**	
						(-2.34)	
Firm Size	0.014***	0.008**	0.007**	0.003	0.011***	0	-0.001
	-4.77	-2.36	-2	-0.81	-3.7	-0.1	(-0.37)
Momentum	0.003	0.001	0	-0.004	-0.006	-0.013	-0.026**
	-0.22	-0.11	-0.03	(-0.34)	(-0.51)	(-1.07)	(-2.25)
F-statistics	2.1	2.94	3.1	4.24	3.02	2.23	8.74
F-statistics(p)	0	0	0	0	0	0	0
Adjusted R	0.05	0.04	0.04	0.06	0.05	0.04	0.14

*E_c (liquidity level), β_1 (market risk), β_2 (Commonality beta), β_3 (Flight to liquidity beta), β_4 (Depressed wealth beta), β_5 (Aggregate liquidity beta), β_6 (Systematic risk). * indicate 10% level of significance, ** indicate 5% level of significance and *** indicate 1% level of significance.*

TABLE 4.38: Results of LCAPM Based on Market Efficiency Coefficient

	Models						
Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Constant	-0.271***	-0.253***	-0.261***	-0.270***	-0.257***	-0.202***	-0.343***
	(-4.61)	(-4.29)	(-4.40)	(-4.62)	(-4.32)	(-3.99)	(-5.76)
E_c	0.014	0.02	0.016	0.016	0.02	0.016	0.037*
	-0.69	-0.97	-0.77	-0.77	-0.93	-0.78	-1.78
1	0.008*	0.043***	0.014*	0.022***	0.041*		0.249***
	1.7	2.66	1.78	2.65	1.73		6.38
2		0.021**					0.207***
		2.34					6.02
3			0.027				-0.675***
			1.22				-6.32
4				0.047**			0.208***
				2.5			5.13
5					0.029*		
					1.65		
6						0.016*	
						1.83	
Firm Size	0.010***	0.008***	0.010***	0.010***	0.008***	0.007***	0.004**
	-4.66	-3.67	-4.37	-4.58	-3.38	-2.97	-1.75
Momentum	0.009	0.012	0.011	0.001	0.015	0.002	-0.051***
	-0.56	-0.77	-0.71	-0.56	-0.94	-0.14	(-2.79)
F-statistics	2.03	2.29	1.99	2.34	2.04	1.95	4.68
F-statistics(p)	0	0	0	0	0	0	0
Adjusted R	0.04	0.04	0.03	0.05	0.05	0.05	0.08

*E_c (liquidity level), β_1 (market risk), β_2 (Commonality beta), β_3 (Flight to liquidity beta), β_4 (Depressed wealth beta), β_5 (Aggregate liquidity beta), β_6 (Systematic risk). * indicate 10% level of significance, ** indicate 5% level of significance and *** indicate 1% level of significance.*

Turn over regression results after testing LCAPM notions in Indian stock market during 2005-2015 are illustrated in table 4.39. Turnover residuals are significantly positive at 10% significance level and empirically prove illiquidity cost has a positive effect on excess return and support illiquidity and return theory.

4.4.6.6 Liquidity Adjusted Capital Asset Pricing Model Based on Turnover

Commonality beta β_2 at individual level in first model is insignificant but at combined level in seventh model is significant and carry the expected sign of theory. β_3 and β_4 are significant at 1% significance level with opposite sign but consistent with the results of other illiquidity measures tested in the context of LCAPM notions in Indian stock market.

TABLE 4.39: Results of LCAPM Based on Turnover

	Models						
Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Constant	-0.102*	-0.138**	0.270**	0.327***	0.259**	0.196*	-0.317**
	(-1.68)	(-2.05)	-2.07	-3.04	-2.13	-1.66	(-2.12)
E_c	0.521*	0.665**	0.302*	-0.102*	0.090*	0.411*	-0.262**
	-1.74	-1.94	-1.66	(-1.75)	-1.73	-1.69	(-2.38)
1	-0.01	0.022**	-0.218**	-0.340***	-0.254***		-0.214**
	(-0.18)	-2.35	(-2.52)	(-3.83)	(-2.79)		(-2.43)
2		0.671					3.845***
		-1.74					-6.65
3			0.893***				-0.451***
			-3.26				(-6.08)
4				0.875***			0.474***
				-4.92			-7.72
5					-0.417***		
					(-3.50)		
6						-0.253***	
						(-2.77)	
Firm Size	0.004***	0.004***	-0.002	0	0	0.002	0.020***
	-2.65	-2.74	(-0.86)	-0.18	(-0.17)	-1.09	-5.39
Momentum	-0.003	-0.009	-0.025*	-0.031**	-0.02	-0.013	-0.049***
	(-0.23)	(-0.72)	(-1.81)	(-2.33)	(-1.54)	(-1.00)	(-3.54)
F-statistics	1.85	1.98	2	2.31	1.65	1.8	5.08
F-statistics(p)	0	0	0	0	0	0	0
Adjusted R	0.07	0.08	0.07	0.07	0.05	0.05	0.08

*E_c (liquidity level), β_1 (market risk), β_2 (Commonality beta), β_3 (Flight to liquidity beta), β_4 (Depressed wealth beta), β_5 (Aggregate liquidity beta), β_6 (Systematic risk). * indicate 10% level of significance, ** indicate 5% level of significance and *** indicate 1% level of significance.*

Positive signs of β_3 and β_4 result in response to expected illiquidity generated as a result of unexpected illiquidity. Aggregate betas β_5 and β_6 are significant at 1% significance level indicating pricing of total systematic and liquidity risks in National stock market of India.

4.4.6.7 Liquidity Adjusted Capital Asset Pricing Model Based on Roll Estimator

Table 4.40 represents the regression results of Roll estimator and examines seven LCAPM models of the study. Significant positive coefficients of Roll estimator E_c at 1% significance level demonstrate the existence of positive relationship between illiquidity cost and excess return in the stock exchange of India during time period 2005-2015.

Individual liquidity betas β_2, β_3, β_4 in the context of Roll estimator are significant but carry opposite sign and contradict with the Chordia et al.(2000), Pastor and Stambaugh (2003) and Acharya and Pedersen (2005). This reject first, second and third hypothesis of the study in the financial market of India.

The significant coefficients of Aggregate betas β_5, β_6 at 1% significance level show that combined liquidity and systematic risk priced in Indian stock market and support the study of Vu et al (2015). They showed the same result in Australian stock market.

The possible notion behind negative commonality beta β_2 is order type commonality that leads to increase the liquidity commonality only but it does not affect the return commonality as a result negative return exists Domowitz and Wang (2002).

Firm size and momentum are found to be insignificant in most of the specifications of LCAPM. This shows that the effects of firm size and momentum are weak in National stock exchange during selected time span of study.

TABLE 4.40: Results of LCAPM Based on Roll Estimator

	Models						
Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Constant	-0.093*	-0.112*	-0.325***	-0.197**	-0.118*	0.053*	-0.410***
	(-1.65)	(-1.65)	(-2.95)	(-2.02)	(-1.72)	-1.76	(-3.34)
E_c	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
	-4.34	-3.28	-4.87	-4.77	-3.29	-3.77	-3.82
1	0.782	0.253**	0.501***	0.341**	0.269**		0.790***
	-0.66	-2.1	-3.04	-2.28	-2.22		-4.62
2		-0.082***					-0.090***
		(-5.37)					(-5.81)
3			0.518***				0.720**
			-3.65				-1.96
4				4.09***			-1.05
				-2.86			(-0.28)
5					-0.084***		
					(-5.46)		
6						-0.074***	
						(-5.02)	
Firm Size	0.003	0.007**	0.012***	0.007**	0.007**	0.001	0.018***
	-1	-2.1	-2.9	-1.97	-2.18	-0.47	-4
Momentum	-0.01	-0.024**	-0.015	-0.016	-0.024**	-0.020*	-0.031**
	(-0.80)	(-1.98)	(-1.22)	(-1.32)	(-2.02)	(-1.65)	(-2.45)
F-statistics	2.25	4.23	3.08	2.7	4.31	4.24	5.05
F-statistics(p)	0	0	0	0	0	0	0
Adjusted R	0.06	0.07	0.05	0.05	0.06	0.07	0.08

*E_c (liquidity level), β_1 (market risk), β_2 (Commonality beta), β_3 (Flight to liquidity beta), β_4 (Depressed wealth beta), β_5 (Aggregate liquidity beta), β_6 (Systematic risk). * indicate 10% level of significance, ** indicate 5% level of significance and *** indicate 1% level of significance.*

4.5 Statistical Analysis of Thailand

Average return during 2005-2015 in Thailand stock exchange is 0.32%.

4.5.1 Descriptive Statistics of Stock Returns and Illiquidity Proxies

Amihud ratio has the highest 4.3 among price impact illiquidity measures. All the liquidity measures have positive skewness indicating the distribution of each liquidity measure is rightly skewed. The positive skewness also demonstrates that average decline in liquidity is frequent. The average standard deviation of price impact measures and depth and breadth liquidity indicator including Amihud

TABLE 4.41: Descriptive Statistics of Illiquidity Proxies and Equity Returns

Variables	**Amihud Measure (AM)**	**Amivest Liquidity (AL)**	**Hui-Heubel Liquidity Ratio (HHLR)**	**Market Efficiency Coefficient (MEC)**	**Zero Return (ZR)**	**Turnover Ratio (TR)**	**Roll Estimator (RE)**	**Stock Returns (Ri)**
Mean	0.1970	1.1851	0.0686	0.0549	0.1778	0.0137	0.4558	0.0032
Median	0.0047	1.2215	0.0019	0.0511	0.1720	0.0094	0.3111	0.0041
Maximum	4.3777	2.8563	1.8180	0.1701	0.3325	0.0664	3.6552	0.0600
Minimum	0.0001	0.0626	0.0007	0.0149	0.0725	0.0007	0.0442	-0.0473
Std. Dev.	0.6460	0.5863	0.2302	0.0275	0.0484	0.0117	0.5135	0.0113
Skewness	4.3442	0.3294	5.1730	1.8798	0.5645	2.3118	3.9032	0.2899
Kurtosis	22.9767	3.6038	33.7976	8.0421	3.3457	8.7632	21.7694	10.3691
Observations	4800	4800	4800	4800	4800	4800	4800	4800

measure, Hui-Heubel liquidity measure and turnover ratio is high as compared to mean observing variation in liquidity form the mean value is large. This also implies high risk of loss when market is illiquid. Excess kurtosis has been observed in all liquidity measures during time period of ten years (2005-2015).

4.5.2 Correlation Matrix of Illiquidity Proxies

The correlation of all proxies used to measure the dimensions of illiquidity is within tolerable limits. Therefore the study used all illiquidity measures for further analysis in stock exchange of Thailand during 2005-2015. Amihud ratio is positively related to Hui-Heubel liquidity ratio, zero return and Roll estimator. The possible notion is large movement of price in response to little volume may widen the spread and more zero return are observed. Market efficiency coefficient is negatively related to Amihud ratio and zero return. Kumar and Misra (2015) demonstrated that when there is high price volatility in the stock market an investor is reluctant to execute a large transaction because it may bring a significant change in price of securities and loss occur. Moreover investors do not trade in the abrupt pricing volatility period and zero returns in equities are observed. There is positive association between Roll estimator and zero return and turnover ratio is negatively related to Roll estimator.

Table 4.42: Correlation Matrix of Illiquidity Proxies

Variables	**Amihud Measure (AM)**	**Amivest Liquidity (AL)**	**Hui-Heubel Liquidity Ratio (HHLR)**	**Market Efficiency Coefficient (MEC)**	**Zero Return (ZR)**	**Turnover Ratio (TR)**	**Roll Estimator (RE)**
Amihud Measure (AM)	1	-0.3301	0.4716	-0.1132	0.4430	-0.1524	0.1251
Amivest Liquidity (AL)	-0.3301	1	-0.3434	0.0460	-0.5602	0.4625	0.1067
Hui-Heubel Liquidity Ratio (HHLR)	0.4716	-0.3434	1	0.0021	0.3214	-0.2101	0.1501
Market Efficiency Coefficient (MEC)	-0.1132	0.0460	0.0021	1	-0.0256	0.0947	0.0425
Zero Return (ZR)	0.4430	-0.5602	0.3214	-0.0256	1	-0.2736	0.1774
Turnover Ratio (TR)	-0.1524	0.4625	-0.2101	0.0947	-0.2736	1	-0.0219
Roll Estimator (RE)	0.1251	0.1067	0.1501	0.0425	0.1774	-0.0219	1

4.5.3 Innovations in Illiquidity Measures

Innovations are calculated for each illiquidity measure in Thailand stock exchange by taking the weighted average of its residuals. The graphical expression of innovations in each illiquidity measure are represented below.The graphs of illiquidity measures Amihud ratio and Hui-Heubel liquidity ratio point no variations during 2008-2015 in Thailand stock market.

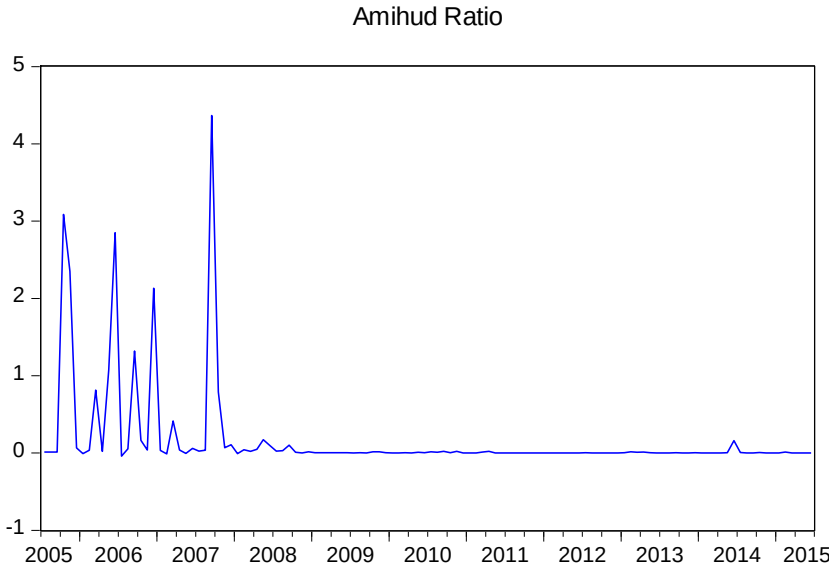

FIGURE 4.33: Innovations in Amihud Ratio

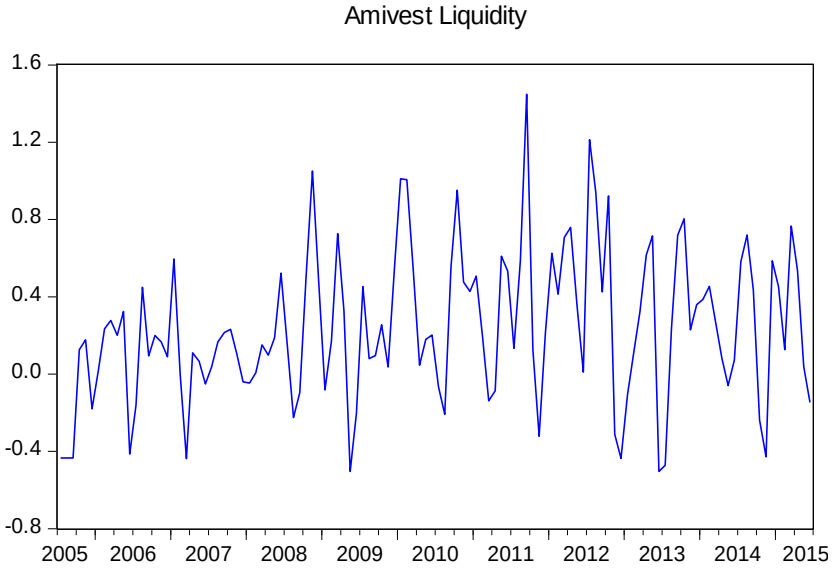

FIGURE 4.34: Innovations in Amivest liquidity

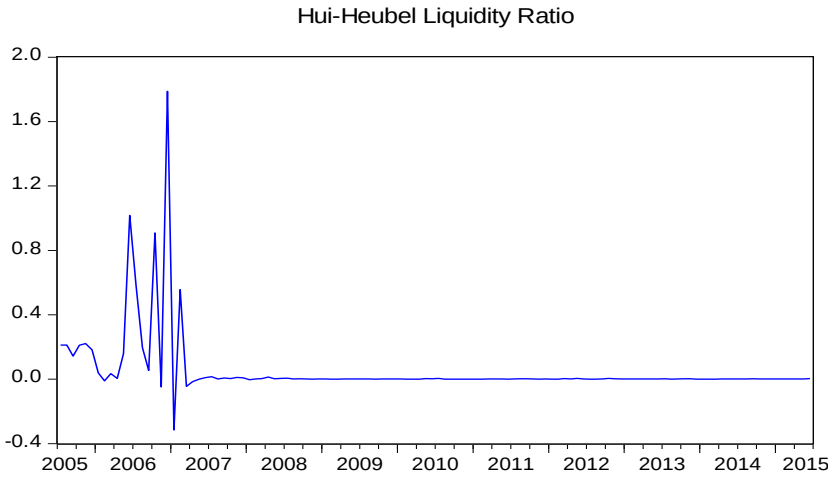

FIGURE 4.35: Innovations in Hui-Heubel liquidity Ratio.

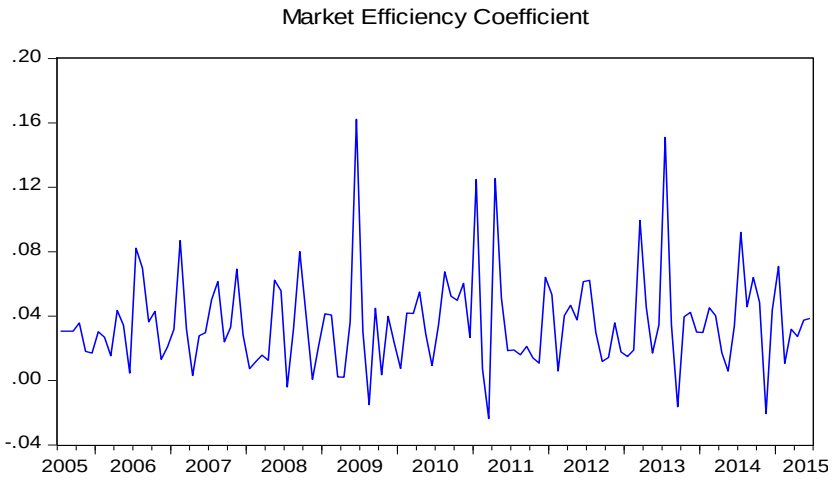

FIGURE 4.36: Innovations in Market Efficiency Coefficient.

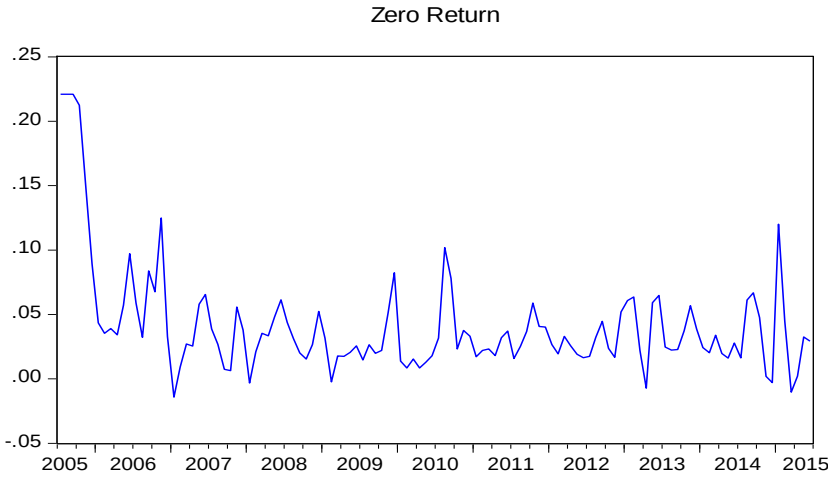

FIGURE 4.37: Innovations in Zero Return.

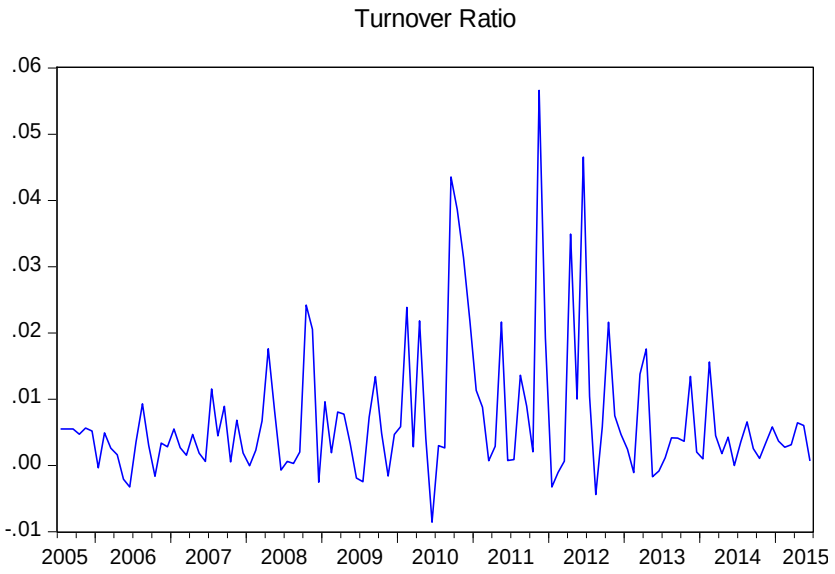

FIGURE 4.38: Innovations in Turnover Ratio.

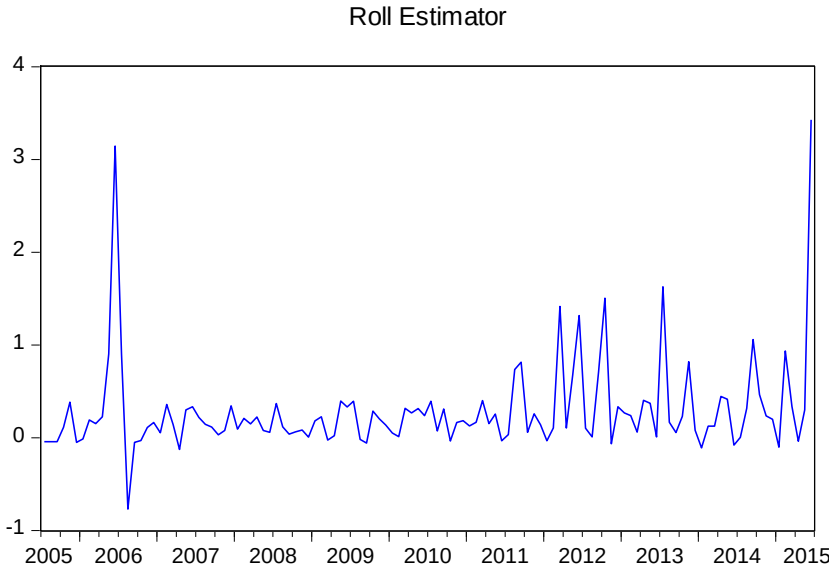

FIGURE 4.39: Innovations in Roll Estimator.

4.5.4 Market Liquidity

Graph illustrates liquidity spirals starting from 2005 and continues around 2008. Liquidity spike during 2005-2006 indicates the liquidity crises originated due to Tsunami, coup détats, civilian and military interim governments in response to it. A huge hump during 2007-2008 represents global financial crises that affect the liquidity of all the Asian stock markets including stock exchange of Thailand. During 2014-2015 political unrest also affects the liquidity in Thailand stock exchange.

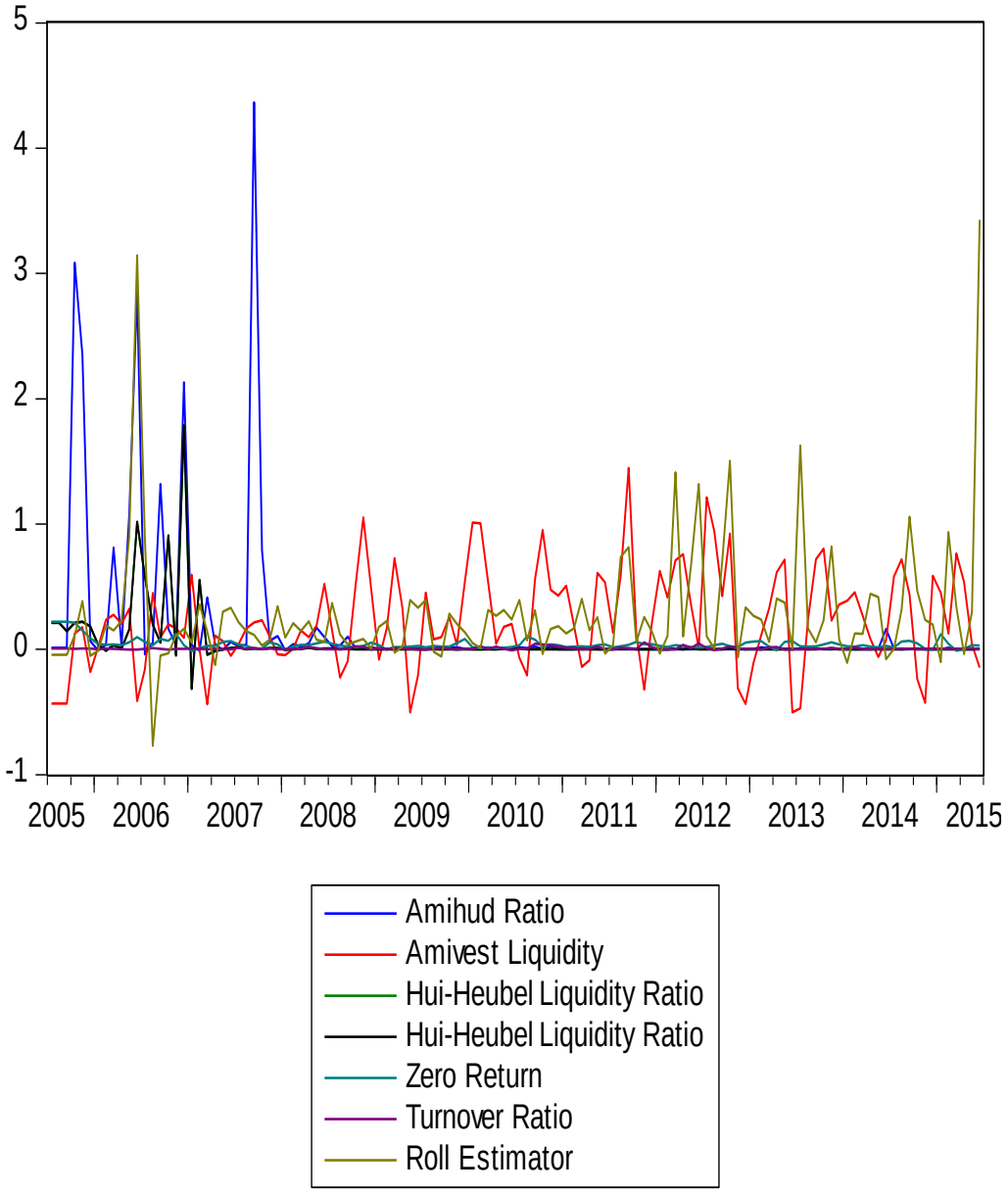

FIGURE 4.40: Market Liquidity.

4.5.5 Betas for Decile Portfolios in Thailand

Average betas for decile portfolios are showing a mixed trend just like the studies Vu et al (2015) and Kim and Lee (2014) conducted in developed markets. Most of the signs of beta 3 and beta 4 are negative and support the LCAPM theory in stock exchange of Thailand.

Amivest liquidity shows a drastic increase in commonality beta β_2 that lead to increase aggregate betas β_5 and β_6 in 6^{th}, 9^{th} and 10^{th} portfolios. In Hui-Heubel liquidity ratio market risk β_1 is highest in 8th portfolio. There is increasing and decreasing trend observed in betas of decile portfolios for each illiquidity measure.

TABLE 4.43: Portfolio Betas for illiquidity.

Panel A Amihud Ratio						
Portfolio	β_1	β_2	β_3	β_4	β_5	β_6
(Lowest) 1	0.2355	0.0872	-0.0210	-0.0221	0.1302	0.3658
2	0.2751	0.0963	-0.0066	0.0026	0.1003	0.3754
3	0.2985	0.0905	-0.0428	-0.0184	0.1516	0.4502
4	0.3364	0.0987	-0.0741	-0.0019	0.1747	0.5111
5	0.2442	0.1310	0.0134	-0.0002	0.1179	0.3620
6	0.2396	0.0998	-0.0572	-0.0012	0.1582	0.3978
7	0.2749	0.1718	-0.0151	-0.0014	0.1883	0.4632
8	0.2882	0.1860	-0.0653	0.0460	0.2053	0.4935
9	0.2893	0.2469	-0.0166	0.0573	0.2062	0.4955
(Highest) 10	0.3683	0.3452	0.0252	-0.2682	0.5882	0.9565
Panel B Amivest Liquidity						
Portfolio	β_1	β_2	β_3	β_4	β_5	β_6
(Lowest) 1	0.0004	0.1379	-0.0064	-0.0025	0.1468	0.1473
2	0.0006	0.1778	0.0041	0.0004	0.1733	0.1737
3	0.0005	0.2134	-0.0021	0.0001	0.2155	0.2159
4	0.0005	0.2808	0.0040	-0.0003	0.2771	0.2776
5	0.0004	0.2773	-0.0022	-0.0020	0.2815	0.2821
6	0.0004	0.9211	-0.0030	-0.0033	0.9274	0.9278
7	0.0015	0.3766	-0.0117	-0.0021	0.3904	0.3919
8	0.0006	0.3911	0.0007	-0.0039	0.3943	0.3949
9	0.0008	0.9254	0.0009	-0.0142	0.9387	0.9395
(Highest) 10	0.0008	0.9583	-0.0014	-0.0295	0.9893	0.9901
Panel C Hui-Heubel Liquidity Ratio						
Portfolio	β_1	β_2	β_3	β_4	β_5	β_6

(Lowest) 1	0.3503	0.0118	-0.0157	-0.0267	0.2501	0.4045
2	0.4564	0.0183	-0.0013	0.0057	0.0138	0.4702
3	0.4925	0.0017	0.0096	-0.0070	-0.0010	0.4915
4	0.5216	0.0288	-0.0060	0.0611	-0.0263	0.4953
5	0.5276	0.0947	-0.0010	-0.1083	0.2040	0.7316
6	0.5476	0.0516	0.0109	-0.0345	0.0753	0.6229
7	0.7561	0.0497	-0.0055	-0.0628	0.1180	0.8742
8	1.0020	0.0058	0.0524	-0.0108	-0.0358	0.9662
9	0.7204	0.0829	-0.0087	-0.0102	0.1018	0.8222
(Highest) 10	0.8299	0.0072	-0.0690	-0.0491	0.1252	0.9552
Panel D Market Efficiency Coefficient						
Portfolio	β_1	β_2	β_3	β_4	β_5	β_6
(Lowest) 1	0.0637	0.7555	-0.0145	-0.0378	0.8077	0.8715
2	0.0771	0.8723	-0.0045	-0.0161	0.8928	0.9700
3	0.0782	0.9252	-0.0579	0.0587	0.9244	1.0026
4	0.0801	0.8905	-0.0473	-0.0303	0.9681	1.0482
5	0.0994	0.9078	-0.0517	-0.0039	0.9635	1.0629
6	0.1083	0.9878	0.0407	-0.0872	1.0343	1.1426
7	0.1671	1.0967	0.0272	-0.0289	1.0983	1.2655
8	0.0818	1.1723	-0.0313	-0.0724	1.2760	1.3578
9	0.0735	1.1160	-0.0479	-0.0325	1.1964	1.2699
(Highest) 10	0.1982	0.9436	-0.0586	0.0484	0.9539	1.1521
Panal E Zero Return						
Portfolio	β_1	β_2	β_3	β_4	β_5	β_6
(Lowest) 1	0.0217	0.6875	-0.0433	-0.0158	0.7466	0.7683
2	0.0325	0.8684	0.0032	0.0290	0.8362	0.8687
3	0.0384	0.6971	0.2049	-0.0607	0.5529	0.5913
4	0.0558	0.8186	-0.0361	-0.0205	0.8752	0.9310
5	0.0698	0.8459	-0.0301	-0.0263	0.9023	0.9721
6	0.0777	0.8628	-0.0113	-0.0501	0.9242	1.0019
7	0.0859	0.9507	-0.0440	-0.0302	1.0249	1.1107

8	0.0907	1.0910	-0.0904	-0.0444	1.2258	1.3165
9	0.0947	1.0222	-0.0278	-0.0100	1.0600	1.1547
(Highest) 10	0.0889	1.3471	-0.0076	-0.0208	1.3754	1.4644

Panel F Turnover Ratio

Portfolio	β_1	β_2	β_3	β_4	β_5	β_6
(Lowest) 1	0.3342	-0.0015	-0.0228	-0.0009	0.0222	0.3563
2	0.4418	0.0716	0.1258	-0.0316	-0.0225	0.4193
3	0.4505	-0.0055	-0.0235	0.0053	0.0128	0.4633
4	0.4376	0.0070	-0.0595	-0.0044	0.0708	0.5084
5	0.6171	0.0583	0.1592	-0.0323	-0.0685	0.5485
6	0.3362	0.1312	-0.0661	-0.0576	0.2549	0.5911
7	0.6213	0.0840	-0.1833	0.0783	0.1890	0.8102
8	0.6500	0.3415	-0.1095	0.1541	0.2969	0.9469
9	0.8985	0.0137	-0.0585	-0.0028	0.0749	0.9734
(Highest) 10	0.8060	0.5006	-0.2246	-0.1890	0.9142	1.7202

Panel G Roll Estimator

Portfolio	β_1	β_2	β_3	β_4	β_5	β_6
(Lowest) 1	0.0025	0.1222	-0.0003	-0.0338	0.1563	0.1587
2	0.0022	0.1858	-0.0068	0.0017	0.1908	0.1930
3	0.0024	0.2092	0.0098	-0.0120	0.2115	0.2138
4	0.0025	0.2305	-0.0041	-0.0020	0.2365	0.2390
5	0.0026	0.2665	0.0020	-0.0020	0.2665	0.2691
6	0.0034	0.2710	-0.0004	-0.0041	0.2754	0.2788
7	0.0035	0.2866	-0.0046	0.0036	0.2877	0.2912
8	0.0044	0.3105	0.0084	0.0005	0.3016	0.3060
9	0.0034	0.5893	-0.0022	-0.0073	0.5988	0.6022
(Highest) 10	0.0023	0.7672	-0.0020	-0.0168	0.7860	0.7883

4.5.6 Results of Liquidity Adjusted Capital Asset Pricing Model for Thailand

4.5.6.1 Liquidity Adjusted Capital Asset Pricing Model Based on Amihud Ratio

Table 4.44 narrates the results of Amihud Ratio for seven specifications of LCAPM. The residuals of innovations in Amihud measure (E_c) are insignificant indicating the liquidity cost does not affect the equity returns in Thailand stock exchange during 2005-2015.

All the individual liquidity betas β_2, β_3 and β_4 are significant with expected signs demonstrating individual liquidity risks are priced in Thailand stock exchange after controlling market risk, firm size and momentum. In Thailand stock exchange commonality premium is 2% at 1% significance level and accept first hypothesis of the study. Similarly the results of the study support the assertions of Pastor and Stambaugh (2003) and Acharya and Pedersen (2005) and accept the second and third hypothesis of the study.

Similarly the statistically significant coefficients of aggregate liquidity risk and cumulative systematic risk support fourth and fifth hypotheses of the study. Investors receive 3.1% aggregate liquidity risk premium and 2.9% total systematic risk premium in Thailand stock exchange during sample period. Among controlling variables firm size is weak but statistically significant coefficients of momentum reveal the effect of momentum is strong in a sample period.

4.5.6.2 Liquidity Adjusted Capital Asset Pricing Model Based on Amivest Liquidity

Table 4.45 illustrates LCAPM specifications' results using Amivest liquidity encountering the price impact feature of liquidity after employing fixed effect regression. All the coefficients of liquidity level E_c are significantly positive at 1% significance level indicating positive relationship between illiquidity cost and stock returns in stock exchange of Thailand during (2005-2015).

TABLE 4.44: Results of LCAPM Based on Amihud Ratio

	Models						
Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Constant	-0.019***	-0.030**	-0.015**	-0.013**	-0.049**	-0.094**	-0.316***
	(-2.61)	(-1.98)	(-2.48)	(-2.40)	(-2.14)	(-2.53)	(-5.73)
E_c	0.003	0.001	0.002	0.002	0.002	-0.007	0
	-0.12	-0.06	-0.08	-0.08	-0.11	(-0.34)	-0.01
1	0.004**	0.029***	0.008***	0.007***	0.036*		0.313***
	-2.05	-3.7	-3.35	-2.95	-1.74		-6.19
2		0.020***					0.295***
		-3.27					-6.05
3			-0.031***				0.01
			(-3.02)				-0.17
4				-0.025***			-0.509***
				(-2.28)			(-6.73)
5					0.031**		
					-2.5		
6						0.029***	
						-2.94	
Firm Size	0.001	0.001	0.001	0.001	0.001	0.003***	0.001
	0.71	0.43	0.55	0.48	0.7	3.33	1.07
Momentum	-0.080***	-0.081***	-0.080***	-0.079***	-0.083***	-0.080***	-0.103***
	-6.98	-7.04	-6.96	-6.9	-7.04	-6.86	-8.88
F-statistics	4.2	4.8	4.6	4.3	4	4	7.3
F-statistics(p)	0	0	0	0	0	0	0
Adjusted R	0.06	0.06	0.07	0.07	0.06	0.07	0.12

*E_c (liquidity level), β_1 (market risk), β_2 (Commonality beta), β_3 (Flight to liquidity beta), β_4 (Depressed wealth beta), β_5 (Aggregate liquidity beta), β_6 (Systematic risk). * indicate 10% level of significance, ** indicate 5% level of significance and *** indicate 1% level of significance.*

Commonality premium of 12.3% exist in the financial market of Thailand if commonality beta β_2 is analyzed at individual level in second model and 20.1% commonality premium is observed in seventh model when all the individual betas and market betas are regressed with excess return in Thailand stock exchange. The

positive coefficients of commonality beta at 1% significance level support Chordia et al.(2001) that investors are rewarded when co movement exist between stock illiquidity and market illiquidity. The result of study accepts LCAPM specification presented as second hypothesis in the study and supports the study of Pukthuanthong and Visaltanachoti (2009) who reported strong evidence of commonality in liquidity in Thailand.

TABLE 4.45: Results of LCAPM Based on Amivest Liquidity

	Models						
Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Constant	-0.151***	-0.259***	-0.135***	-0.118***	-0.305***	-0.316***	-0.435***
	(-5.99)	(-7.42)	(-3.77)	(-3.57)	(-7.51)	(-7.83)	(-6.28)
E_c	0.005***	0.006***	0.005***	0.005***	0.006***	0.006***	0.006***
	-5.92	-6.96	-5.93	-6.12	-7.07	-7.27	-6.89
1	0.118***	0.416***	0.962**	0.707*	0.538**		0.135***
	5.38	1.65	2.39	1.91	2.11		3.37
2		0.123***					0.201***
		4.42					4.83
3			0.224				-1.735***
			0.66				-2.04
4				0.5			0.314
				1.6			0.36
5					0.151***		
					4.78		
6						0.185***	
						6.95	
Firm Size	0.006***	0.006***	0.005***	0.005***	0.006***	0.005***	0.009***
	-6	-5.59	-3.82	-3.56	-6.37	-6.05	-5.97
Momentum	-0.096***	-0.086***	-0.096***	-0.095***	-0.085***	-0.077***	-0.084***
	(-8.51)	(-7.58)	(-8.42)	(-8.35)	(-7.47)	(-7.19)	(-7.40)
F-statistics	9.12	10.09	8.5	8.67	10.37	10.8	9.6
F-statistics(p)	0	0	0	0	0	0	0
Adjusted R	0.12	0.15	0.12	0.13	0.15	0.15	0.16

*E_c (liquidity level), β_1 (market risk), β_2 (Commonality beta), β_3 (Flight to liquidity beta), β_4 (Depressed wealth beta), β_5 (Aggregate liquidity beta), β_6 (Systematic risk). * indicate 10% level of significance, ** indicate 5% level of significance and *** indicate 1% level of significance.*

Other individual betas β_3 and β_4 are not significant in second and third model demonstrating investors do not accept low return for those securities that are liquid in illiquid conditions. Moreover investors are not willing to sacrifice low return today for those securities that give high return in bearish situation of market. The findings are against Paster and Stambaugh (2003) and Acharya and Pedersen and reject third and fourth hypotheses of the study in Thailand stock exchange. At 1% significance level (β_5 and β_6) combined liquidity risk and systematic risk are positively significant indicating total risks either liquidity or systematic both are priced in Thailand financial market during the data period .Therefore four and fifth hypotheses of the study are accepted in this financial market.

4.5.6.3 Liquidity Adjusted Capital Asset Pricing Model Based on Hui-Heubel Liquidity Ratio

Table 4.46 shows the regression results of Hui-Heubel liquidity ratio in Thailand stock exchange during sample period 2005-2015. The insignificant coefficients of liquidity cost (E_c) demonstrate that price impact illiquidity cost measured through Hui-Heubel liquidity ratio has no effect on excess return. Price changes over 5-day time period or short term price volatility do not have any impact on excess return. Among all liquidity betas only commonality beta is significant at 5% significance level while other liquidity betas (β_3, β_4, β_5 and β_6) are insignificant demonstrating that flight to liquidity beta, depressed wealth beta, combined liquidity risk beta and total systematic risk beta are not priced in the financial market of Thailand. Therefore all the null hypotheses except one are rejected in this capital market. The results of liquidity risks in the context of Hui-Heubel liquidity ratio are in contrasting with liquidity adjusted Capital asset pricing model proposed by Acharya and Pedersen (2005).

The findings of the study are in contrast with (Vu et al., 2015; Kim and Lee, 2014) but support the study of Ahmed and Grobanko (2014) who found the same result

in French stock market that liquidity cost or liquidity risks are not priced. He argued that liquidity measure used for liquidity risk and liquidity cost matters a lot. It affects one market but in other stock market the same liquidity measure does not play any role in the form of liquidity cost or liquidity risk. In French stock market Amihud measure of liquidity as liquidity cost and liquidity risks has been failed but in other stock markets including Australia and US the same liquidity measure has been priced as liquidity cost and liquidity risks as well.

TABLE 4.46: Results of LCAPM Based on Hui-Heubel Liquidity Ratio

	Models						
Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Constant	-0.117***	-0.142***	-0.135***	-0.142***	-0.125***	-0.072***	-0.137***
	(-3.77)	(-4.25)	(-3.63)	(-4.19)	(-3.97)	(-3.13)	(-3.51)
E_c	0.485	0.526	0.487	0.542	0.497	0.389	0.557
	-1.39	-1.5	-1.39	-1.55	-1.42	-1.12	-1.57
1	-0.003**	-0.003**	-0.004**	-0.004**	-0.002*		-0.003*
	(-1.99)	(-2.13)	(-2.15)	(-2.57)	(-1.67)		(-1.85)
2		0.002**					0.001
		-1.97					-0.67
3			0.008				-0.006
			-0.9				(-0.45)
4				0.004			0.004
				-1.82			-0.68
5					0.002		
					-1.42		
6						0.001	
						-0.05	
Firm Size	0.005***	0.006***	0.006***	0.006***	0.005***	0.003***	0.006***
	-3.86	-4.32	-3.7	-4.27	-4.04	-3.23	-3.58
Momentum	-0.083***	-0.085***	-0.084***	-0.084***	-0.085***	-0.080***	-0.084***
	(-7.21)	(-7.38)	(-7.26)	(-7.28)	(-7.32)	(-6.98)	(-7.24)
F-statistics	4.46	4.44	4.2	4.39	4.29	4.13	3.9
F-statistics(p)	0	0	0	0	0	0	0
Adjusted R	0.06	0.06	0.06	0.06	0.06	0.05	0.06

*E_c (liquidity level), β_1 (market risk), β_2 (Commonality beta), β_3 (Flight to liquidity beta), β_4 (Depressed wealth beta), β_5 (Aggregate liquidity beta), β_6 (Systematic risk). * indicate 10% level of significance, ** indicate 5% level of significance and *** indicate 1% level of significance.*

TABLE 4.47: Results of LCAPM Based on Zero Return

	Models						
Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Constant	0.022**	0.009**	0.216***	0.146**	0.467***	0.390***	0.280**
	-2.35	-2.14	-3.82	-2.21	-7.4	-6.58	-2.54
E_c	0.022	0.021	-0.044**	0.002	-0.040**	-0.035*	-0.046**
	-1.05	-1	(-2.40)	-0.1	(-2.17)	(-1.86)	(-2.48)
1	0.303***	0.314***	0.018*	0.126**	-0.236***		-0.042*
	-7.53	-7.48	-1.84	-2.47	(-4.64)		(-1.75)
2		0.029					-0.114
		-0.91					(-1.34)
3			0.413***				0.459
			6.07				10.01
4				0.407***			-0.032
				5.45			-0.13
5					-0.361***		
					-5.7		
6						-0.388***	
						-5.58	
Firm Size	-0.001	-0.002	-0.008***	-0.005**	-0.004	0.001	-0.006**
	(-0.49)	(-0.69)	(-3.35)	(-2.02)	(-1.58)	-0.46	(-2.53)
Momentum	-0.071***	-0.073***	-0.333***	-0.131***	-0.328***	-0.335***	-0.349***
	(-6.2)	(-6.2)	(-5.6)	(-8.3)	(-5.2)	(-5.6)	(-5.2)
F-statistics	7.24	6.78	9.09	9.12	9.2	9.83	9.61
F-statistics(p)	0	0	0	0	0	0	0
Adjusted R	0.1	0.1	0.31	0.13	0.31	0.31	0.33

*E_c (liquidity level), β_1 (market risk), β_2 (Commonality beta), β_3 (Flight to liquidity beta), β_4 (Depressed wealth beta), β_5 (Aggregate liquidity beta), β_6 (Systematic risk). * indicate 10% level of significance, ** indicate 5% level of significance and *** indicate 1% level of significance.*

4.5.6.4 Liquidity Adjusted Capital Asset Pricing Model Based on Zero Return

Table 4.47 reveals the panel regression results of 1 to 7 models derived from LCAPM specifications for illiquidity measure zero return. Regression coefficients of E_c are found to be insignificant at 1st 2nd and 4th model and significant at 3^{rd}, 5^{th}, 6^{th} and 7^{th} model. It means the effect of illiquidity cost zero return on equity excess return in Thailand stock exchange is weak during sample period.

Commonality beta β_2 is insignificant with expected sign indicating commonality liquidity premium in the perspective of zero return has not been priced in Thailand equities from 2005 to 2015. As far as other liquidity betas β_3 and β_4 are analyzed their coefficients are statistically significant at 1% significance level with t-statistics 6.07 and 5.45. The signs of β_3 and β_4 are against with Pastor and Stambaugh (2003) and Acharya and Pedersen (2005). The opposite sign shows unexpected illiquidity along with asymmetrical information, non-transparency in the affairs of stock market especially in the environment of frequent short term volatility.

Combined liquidity risk and systematic risk denoted by β_5 and β_6 are significant at 1% significance level. Therefore four and fifth hypotheses of the study has been accepted. Petersen (2013) also found that negative liquidity premium shows constrained market premium for betas of liquidity.

4.5.6.5 Liquidity Adjusted Capital Asset Pricing Model Based on Market Efficiency Coefficient

Results of panel regressions for LCAPM specifications in the context of market efficiency coefficient are reported in table 4.48. T-statistics of residuals of innovations in market efficiency coefficient are above 2.58 indicating E_c is significant at 1% level. In Thailand stock exchange market efficiency coefficient negatively affect the excess return during 2005-2015. It means frequently short term volatility along with unexpected illiquidity exists in the Thailand financial market.

Individual betas β_2, β_3 and β_4 during the time span 2005-2015 are insignificant and contradict with the assertions of Chordia et al. (2001), Pastor and Stambaugh

(2005) and Acharya and Pedersen (2005). But when combined betas are analyzed β_5 and β_6 are significant at 10% significance level. The pricing of combined liquidity risk and cumulative systematic risk subsist in Thailand stock exchange during sample period.

TABLE 4.48: Results of LCAPM Based on Market Efficiency Coefficient

	Models						
Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Constant	-0.075***	-0.030*	-0.070*	-0.053*	0.014*	-0.045*	0.230***
	-3.56	-1.69	-1.86	-1.88	1.86	-1.9	3.07
E_c	-0.055***	-0.056***	-0.056***	-0.056***	-0.059***	-0.056***	-0.058***
	(-5.45)	(-5.52)	(-5.44)	(-5.47)	(-5.70)	(-5.42)	(-5.68)
1	0.034***	0.038***	0.036**	0.042**	-0.020*		-0.092***
	-2.61	-2.78	-2.04	-2.42	(-1.66)		(-2.74)
2		-0.009					-0.164***
		(-0.98)					(-4.25)
3			-0.003				-1.374***
			(-0.16)				(-6.59)
4				-0.012			-0.842***
				(-0.71)			(-5.73)
5					-0.064		
					(-1.02)		
6						-0.018*	
						(-1.67)	
Firm Size	0.003***	0.002	0.003*	0.002	0.002**	0.003***	-0.002
	-3.72	-0.96	-1.87	-1.4	-2.31	-2.89	(-1.03)
Momentum	-0.094***	-0.091***	-0.094***	-0.093***	-0.091***	-0.079***	-0.105***
	(-7.73)	(-7.23)	(-7.50)	(-7.45)	(-7.34)	(-6.68)	(-8.24)
F-statistics	7.03	6.59	6.52	6.56	6.78	6.47	8.87
F-statistics(p)	0	0	0	0	0	0	0
Adjusted R	0.1	0.1	0.1	0.1	0.1	0.09	0.15

*E_c (liquidity level), β_1 (market risk), β_2 (Commonality beta), β_3 (Flight to liquidity beta), β_4 (Depressed wealth beta), β_5 (Aggregate liquidity beta), β_6 (Systematic risk). * indicate 10% level of significance, ** indicate 5% level of significance and *** indicate 1% level of significance.*

The results of illiquidity cost market efficiency measure support the effect of combined level of systematic risk on excess return and negate the effect of individual liquidity risk betas and total liquidity risk in this financial market. Petersen (2013) found that total systematic risk exist in the developed market when liquidity level is priced where as if individual liquidity risks do not have separately liquidity premium then total liquidity risk will not be found in that market except Japan.

4.5.6.6 Liquidity Adjusted Capital Asset Pricing Model Based on Turnover

Regression results of turnover are narrated in table 4.49. Residuals of innovations in turnover (E_c) are significant at 10% significance level in stock exchange of Thailand. The negative coefficients of E_c show illiquidity cost affect the returns negatively. Chen et al.(2011) argued that negative return results when investor demand more illiquid premium for illiquid risk as compensation.

Moreover they found in their study; liquidity and asset pricing that turnover is one of the investment styles that always outperform. Low turnover or less liquid stock will trade on discount as compared to high turnover stock.

Return sensitivity to liquidity beta and liquidity sensitivity to return beta (β_3 and β_4) are significant at 1% significant level with expected signs and accept second and third hypothesis of the study. The findings of the study support the assertions of Pastor and Stambaugh (2003) and Acharya and Pedersen (2005).

The negative significant coefficients of β_3 and β_4 reveal that individual liquidity risks are priced in stock market of Thailand during 2005-2015. Commonality beta β_2 is also significant at 1% significance level with opposite sign and contradict with Chordia et al.(2001).

Combined illiquid and systematic risks (β_5 and β_6) are also significant along with firm size and momentum at 1% significance level. Therefore fourth and fifth hypotheses regarding pricing of total liquidity and systematic risks are accepted in this financial market. Anthonisz and Putnins (2016) demonstrated negative liquidity premium.

TABLE 4.49: Results of LCAPM Based on Turnover

	Models						
Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Constant	-0.128***	0.409***	0.334***	0.390***	0.016*	-0.122***	0.337***
	-3.18	5.89	4.86	5.14	1.69	-5.68	4.52
E_c	-0.010**	-0.031**	-0.027*	-0.030*	-0.020*	0.002**	-0.032*
	-2.33	-1.96	-1.91	-1.71	-1.67	2.08	-1.89
1	0.004*	0.037***	0.028***	0.018***	-0.266***		0.215***
	-1.86	-7.43	-7.66	-6.48	(-8.77)		-5.52
2		-0.057***					-0.212***
		(-9.25)					(-6.21)
3			-0.123***				0.256***
			(-8.12)				-3.78
4				-0.101***			0.112***
				(-7.93)			-2.71
5					-0.255***		
					(-8.94)		
6						-0.188***	
						(-8.21)	
Firm Size	0.005***	-0.014***	-0.014***	-0.016***	0.010***	0.013***	-0.005***
	-3.32	(-5.46)	(-4.89)	(-5.12)	-6.31	-8.68	(-1.32)
Momentum	-0.080***	-0.096***	-0.087***	-0.084***	-0.131***	-0.126***	-0.123***
	(-6.89)	(-8.64)	(-7.76)	(-7.47)	(-8.55)	(-8.07)	(-8.88)
F-statistics	4.07	10.34	8.84	8.6	9.91	9.33	10.63
F-statistics(p)	0	0	0	0	0	0	0
Adjusted R	0.1	0.15	0.13	0.13	0.15	0.13	0.18

*E_c (liquidity level), β_1 (market risk), β_2 (Commonality beta), β_3 (Flight to liquidity beta), β_4 (Depressed wealth beta), β_5 (Aggregate liquidity beta), β_6 (Systematic risk). * indicate 10% level of significance, ** indicate 5% level of significance and *** indicate 1% level of significance.*

Table 4.50 shows the regression results of seven models in the perspective of transaction cost illiquidity measure. Liquidity level E_c is positive and significant in all models that illustrates positive association between excess return and illiquidity cost.

TABLE 4.50: Results of LCAPM Based on Roll Estimator

	Models						
Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Constant	-0.053**	-0.059**	-0.057**	-0.037*	-0.053*	-0.057**	-0.101***
	(-2.10)	(-2.21)	(-2.26)	(-1.74)	(-1.95)	(-2.53)	(-2.69)
E_c	0.004***	0.004***	0.004***	0.004***	0.004***	0.004***	0.005***
	-4.01	-3.99	-4.08	-4.04	-4	-4.07	-4.65
1	-0.069*	-0.021*	-0.013*	-0.416*	-0.066*		0.990***
	(-1.67)	(-1.88)	(-1.85)	(-1.69)	(-1.75)		-2.95
2		0.007					-0.114***
		-0.68					(-5.21)
3			0.269***				-2.528***
			-3.23				(-5.21)
4				0.324***			-2.143***
				-2.79			(-3.85)
5					0.001		
					-0.03		
6						0.001**	
						-2.11	
Firm Size	0.002**	0.002**	0.002**	0.002*	0.002**	0.002***	0.009***
	-2.25	-2.2	-2.38	-1.74	-2.25	-2.62	-4.92
Momentum	-0.079***	-0.079***	-0.078***	-0.076***	-0.079***	-0.078***	-0.082***
	(-6.69)	(-6.71)	(-6.66)	(-6.47)	(-6.67)	(-6.82)	(-6.94)
F-statistics	5.42	5.06	5.84	5.64	5.03	5.41	7.15
F-statistics(p)	0	0	0	0	0	0	0
Adjusted R	0.07	0.07	0.09	0.08	0.07	0.07	0.12

*E_c (liquidity level), β_1 (market risk), β_2 (Commonality beta), β_3 (Flight to liquidity beta), β_4 (Depressed wealth beta), β_5 (Aggregate liquidity beta), β_6 (Systematic risk). * indicate 10% level of significance, ** indicate 5% level of significance and *** indicate 1% level of significance.*

Individual commonality beta β_2 in second regression model is not significant indicating commonality premium due to co movement of stock liquidity or market liquidity is not present in the Thailand stock exchange during 2005-2015. Therefore second hypothesis is found to be rejected while Roll estimator as illiquidity

cost measure is analyzed. β_3 and β_4 are significant but with opposite signs and contradict with Pastor and Stambaugh (2003) and Acharya and Pedersen (2005).

4.5.6.7 Liquidity Adjusted Capital Asset Pricing Model Based on Roll Estimator

The insignificant coefficient of aggregate liquidity beta at all significance levels indicates liquidity risk is not priced in the financial market of Thailand but found systematic risk in this market. The result of the study support Petersen (2013) who found the same result in a developed market. Roll estimator regression results for seven models accept fifth hypothesis and reject all the remaining hypotheses of the study.

4.6 Results and Discussion

The study has been conducted to test the various hypotheses of Liquidity adjusted capital asset pricing model proposed by Acharya and Pedersen (2005) in Asian stock markets including Pakistan, China, India, Thailand and Japan during 2005-2015. Moreover multidimensional liquidity measures have been used to compute and analyze different channels of illiquidity risks.

Before analyzing different channels of liquidity risks that develop hypotheses of LCAPM model; liquidity level of different illiquidity measures has been analyzed. Liquidity level is represented in LCAPM specification as E_c. In Japan liquidity level is positive in all illiquidity measures except zero return and Hui-Heubel liquidity ratio. It means illiquidity cost positively affects the excess return. A large number of negative significant coefficients of E-c as compared to positive significant coefficients indicate negative association between illiquidity measures including Amihud ratio, Hui-Heubel liquidity ratio, turn over and Roll estimator with excess return in Pakistan stock exchange during 2005-2015.

As far as National stock exchange of India has been concerned; Amihud ratio and Amivest liquidity affects the excess return negatively. Moreover Hui-Heubel

liquidity ratio,turnover and Roll estimator have positive association with excess return in this financial market. Illiquidity measures such as market efficiency coefficient and zero return have no effect on excess return in Indian stock market during ten years sampling period. In China like Pakistan a large number of negative significant coefficients show illiquidity cost affects the excess return negatively in Shenzhen stock exchange during 2005-2015. In stock exchange of Thailand Amivest liquidity and Roll estimator show positive relationship between liquidity cost and equity excess return where as illiquidity cost measured through market efficiency coefficient and turnover affect the excess return negatively during sampling period. There are certain illiquidity measures Amihud ratio, Hui-Heubel liquidity ratio and zero return show that illiquidity cost has no effect on excess return of equities in Thailand stock exchange.

Among Asian stock markets stock exchanges of Thailand and India show comparatively large number of illiquidity measures that show no association with level of liquidity and excess return during ten years data from 2005-2015. The studies in literature including (Lam & Tam, 2011; Kim & Lee, 2013 and Vu et al., 2015) found positive relationship between level of illiquidity and excess return in developed stock markets of New York stock exchange and Australian stock exchange and support the theory of Amihud and Mendelson (1986). However another study of Nguyen and Lo (2012) in New Zealand stock market investigated that illiquid stock has lower returns as compared to liquid stocks and contradicts with the theory of Amihud and Mendelsen (1986).

The results of current study found positive effect of illiquidity level on excess return in Japan like (Lam & Tam, 2011; Kim & Lee, 2013 and Vu et al., 2015). In emerging markets including Pakistan and China show negative relationship between illiquidity cost and excess equity returns and support the results of (Nguyen & Lo, 2012). Eun and Haung (2007) demonstrated that negative association between illiquidity level and excess return represent short term preference of investors' trading. Investors usually prefer to pay premium for liquid stocks as compared to receive illiquidity premium in illiquid stocks. Butt (2015) found no effect of illiquidity cost on excess equity return in emerging Finnish market like India and

Thailand.

The first hypothesis of Liquidity adjusted capital asset pricing model is derived from the assertion of Chordia et al.(2001). It is stated that commonality in liquidity is positively related to excess equity returns in Asian stock markets. Findings of the study illustrate commonality beta β_2 exist(3.1%, 2.8% and 4.3%) positively in Japan with respect to price impact liquidity measures Amihud Ratio, Zero return and Market efficiency coefficient. In China positive commonality premium of (6.8% and 3.0%) subsists with respect to Amivest liquidity and Hui-Heubel liquidity ratio. β_2 has a positive association of (12.5%, 2.2%, 2.1% and 6.7%) with excess equity returns in India in perspective of Amihud Ratio, zero return, market efficiency coefficient and turnover.

Pakistan stock exchange has also commonality in liquidity of 2.7% and 3.8% in the context of zero return and turnover. Therefore first hypothesis of the study is accepted that liquidity commonality risk is priced in Asian equity markets during time span 2005-2015 and investors demand high expected return from those stocks whose liquidity is sensitive to liquidity shocks in market. The result of the current study support the studies including Vu et al. (2015) and Foren et al. (2015) who found that commonality liquidity β_2 is priced in Australian stock exchange and London stock exchange. Butt (2015) and Butt and Virk (2015) found pricing of commonality liquidity in Finnish stock market with respect to Amihud measure but liquidity commonality is insignificant with respect to zero return in Finish stock market and contradict with the result of the study. Hirevonen (2016) also found commonality in liquidity in Finnish stock market.

The current study also found significant commonality in liquidity beta β_2 with negative sign in all Asian equity markets. In Japan commonality beta is negative and significant with respect to Amivest liquidity. Similarly China has also negative β_2 while using liquidity measures Amihud ratio, Zero return, turnover and Roll estimator. Pakistan and Thailand have found negative significant commonality beta β_2 due to Amivest liquidity and turnover. In India negative significant β_2 results in response to illiquidity measures Amivest liquidity, Hui-Heubel liquidity ratio and Roll estimator. Hongzing and Duduchoge (2017) also found negative

but significant β_2 in Ghana stock market. Domowitz and Wang (2002) demonstrated that positive association result when liquidity commonality and return commonality exist at the same time. There are different sources that causes return commonality and liquidity commonality. Co movement in order type brings liquidity commonality whereas co movement in order flow creates return commonality. Clark (2008) argued that stocks whose liquidity decreases with market illiquidity do not have prices that are more receptive to market liquidity. Therefore negative equity returns result. More significant coefficients of commonality beta as compared to insignificant coefficients empirically prove that liquidity commonality is priced in Asian financial markets.

TABLE 4.51: Results of Commonality in Liquidity (β_2) In Asian Countries.

Asian Countries	**Amihud Measure (AM)**	**Amivest Liquidity (AL)**	**Hui-Heubel Liquidity Ratio (HHLR)**	**Market Efficiency Coefficient (MEC)**	**Zero Return (ZR)**	**Turnover Ratio (TR)**	**Roll Estimator (RE)**
Japan	0.031***	-0.045*	-0.003	0.043***	0.028***	-0.045*	0.098***
	(7.50)	(-1.75)	(-0.80)	(8.25)	(3.31)	(-1.75)	(2.94)
Pakistan	-0.076	-0.045*	0.000	0.006	0.000	1.038***	-0.012
	(-0.09)	(-1.75)	(-0.19)	(1.55)	(-0.04)	(2.07)	(-0.70)
India	0.125***	-0.014***	-0.069***	0.021***	0.022***	0.671*	-0.082***
	(4.83)	(-2.97)	(-3.03)	(2.34)	(3.66)	(1.74)	(-5.37)
China	-0.024***	0.068***	0.030***	0.013	-0.075***	-0.023***	-0.064***
	(-2.86)	(3.84)	(4.71)	(1.33)	(-7.55)	(-3.73)	(-3.65)
Thailand	0.020***	0.123***	0.002**	-0.009	0.029	-0.057***	0.007
	(3.27)	(4.42)	(1.97)	(-0.98)	(0.91)	(-9.25)	(0.68)

Second Hypothesis of Liquidity adjusted capital asset pricing model is derived from the assertion of Pastor and Stambaugh (2003) that low return is acceptable for those stocks that yield high return in less liquid market conditions. This is second channel of liquidity risk named as return sensitivity to liquidity or flight to liquidity. The second liquidity risk is represented as β_3. The hypothesis developed from Pastor and Stambaugh assertion to analyze in the study is there is negative relationship between excess return when co moment between stock return and market liquidity exist.

Table 4.52 illustrates the results of β_3 with t-statistics in all Asian stock markets. In Japan negative significant coefficients of β_3 (-0.087, -0.086) exist with respect to liquidity measures, market efficiency coefficient and Roll estimator. In emerging markets except Pakistan return sensitivity to liquidity exist (-0.029, -0.137, -0.073, -0.154) with respect to Amivest liquidity in India, with respect to Amivest liquidity, zero return, turnover and Roll estimator in China.

Thailand also found negative significant β_3 (-0.031, -0.123) due to illiquidity measure Amihud Ratio and turnover. The results of the study accept the second hypothesis of LCAPM proposed by Acharya and Pedersen (2005) and are in line with Vu et al (2016).

Table 4.52 also found positive significant coefficients of β_3 in Asian markets and contradict with Pastor and Stambaugh (2003). β_3 is positive in Japan, Pakistan and China in the context of illiquidity measure zero return, turnover ratio and Amihud measure. Thailand also found positive significant coefficients of β_3 due to zero return and Roll estimator.

A large number of positive significant coefficients of β_3 are found in India with respect to Amihud measure, zero return, turnover and Roll estimator. Hirvonen (2016) also show positive significant coefficient of β_3 in Finnish stock market with respect to illiquidity measure Amihud ratio.

The contradict result of the study against Pastor and Stambaugh (2003) found. The rationale behind the significance of β_3 with opposite sign is discussed through the argument given by Bakaert et al (2007). They argued that LCAPM theory

is Based upon developed market of US. The features of developed market are entirely different from emerging market.In developed markets information with all the essential details are readily available to the investors.

Therefore asymmetric information is less in developed market as compared to emerging market. Secondly, companies in developed market that usually issued stock have ownership structure of diversified nature. Therefore when investors invest in these securities they are also diversified.

Due to these characteristics of developed markets illiquidity effect is small. On the other hand emerging markets do not contain the information of same quality. Investors are not able to take information in detail. Minovic and Zivkovic (2010) demonstrated that the biggest hurdle in emerging market is the impact of illiquidity is large.

There are various reasons for it. Number of outstanding shares is less, market capitalization is less, trading is not regular or less frequent, transparent information is not available and easily assess of adequate information is not available. These invisible risks lead to increase the systematic risk in emerging markets.

Anthonisz and Putnins (2016) argued liquidity risk can be classified as upside liquidity risk and downside liquidity risk. In emerging markets asymmetric information causes the movement of liquidity with market return. Upside liquidity risks causes positive excess return. Moreover Yakove Amihud (2002) viewed market returns are lowered due to unexpected market illiquidity but when high illiquidity is realized it will create expected liquidity that will lead to increase the excess returns.

The LCAPM theory proposed by Acharya and Pedersen (2005) supported developed market more as compared to emerging markets. In LCAPM second channel of risk β_3 has negative association with excess return. Lee (2011) found insignificant β_3 in developed market. Nguyen and Lo (2013) also reported that β_3 has not priced in financial market of New Zealand. The study found significant β_3 with positive signs as well. It means gray area persist in the theory that need to be addressed in the future.

TABLE 4.52: Results of Flight to liquidity Beta (β_3) in Asian Countries.

Asian Countries	**Amihud Measure (AM)**	**Amivest Liquidity (AL)**	**Hui-Heubel Liquidity Ratio (HHLR)**	**Market Efficiency Coefficient (MEC)**	**Zero Return (ZR)**	**Turnover Ratio (TR)**	**Roll Estimator (RE)**
Japan	-0.031	-0.055	0.852	-0.087***	0.076***	-0.055	-0.086***
	(-1.17)	(-1.22)	(1.35)	(-7.75)	(3.17)	(-1.22)	(-5.98)
Pakistan	-0.101	-0.055	0.001	0.012	-0.016	0.152***	0.101
	(-0.44)	(-1.22)	(0.68)	(1.35)	(0.11)	(3.11)	(1.09)
India	0.186***	-0.029***	0.715	0.027	0.048***	0.893***	0.518***
	(4.61)	(-3.20)	(0.62)	(1.22)	(3.94)	(3.26)	(3.65)
China	0.098***	-0.47	0.023	0.030	-0.137***	-0.073***	-0.154***
	(2.64)	(-0.77)	(1.43)	(1.40)	(-6.97)	(-4.90)	(-2.41)
Thailand	-0.031***	0.224	0.008	-0.003	0.413***	-0.123***	0.269***
	(-3.02)	(0.66)	(0.90)	(-0.16)	(6.07)	(-8.12)	(3.23)

Third channel of liquidity risk in LCAPM model is based upon the assertion of Acharya and Pedersen (2005). It is also named as depressed wealth effect or sensitivity of liquidity with respect to market return. It is denoted by β_4 in the study. β_4 has negative association with expected return because investors want to invest in those stocks that remain liquid when market is down.

They accept low returns for those stocks that yield high return in illiquid market conditions. Table 4.53 shows negative significant coefficients (-0.028, -0.084, -0.091) of β_4 with respect to Amihud measure, market efficiency coefficient and Roll estimator in Japan. In Pakistan the price impact illiquidity measures such as Hui-Huebel liquidity ratio and zero retun found negative significant coefficients (-0.002, -0.036) of β_4.

A large number of negative significant coefficients (-1.783, -0.108, -0.080, -0.234) of β_4 in China due to illiquidity measures Amivest liquidity, zero return, turnover and Roll estimator are found in the study. Thailand also showed depressed wealth beta β_4 (-0.025, -0.101) effect on excess return in the perspective of illiquidity measures Amihud measure and turnover ratio.

In India only one illiquidity measure; Amivest liquidity shows negative significant (-0.026) β_4 during sample period 2005-2015. Significant negative coefficients of β_4 in Asian stock markets accept the fourth hypothesis of the study that excess return are negatively affected by β_4 during 2005-2015 in the financial markets of Asia.

In India negative significant beta β_4 are less as compared to other equity financial markets of Asia. Results also found insignificant beta β_4 in stock exchanges of Asia but the coefficients of insignificant β_4 are less as compared to significant negative β_4. Therefore third hypothesis based upon the assertion of Acharya and Pedersen (2005) has been accepted.

It means investors in this market pay premium for those stocks whose liquidity is not affected in poor return market conditions. Hagstromal et al (2013) demonstrated depressed wealth effect contributed 0.68% premium in U.S stock market.

Similarly Kim and Lee (2014) also found pricing of liquidity risk due to β_4 in U.S stock market. The above results support that the wealth shocks are hedged by the investors through paying premium for liquid stocks and demonstrate that depressed wealth effect is one of the important dimensions of liquidity risks that is priced in Asian equity markets during 2005-2015.

The declining situation of market leads to increase the marginal utility of consumption due to decline in wealth and consumption. Investors usually pay more for trading of stocks and this will aggravate their situation. The findings of the study show that investors are compensated in Asian markets when they bear the risk of reduction in wealth.

Vu et al. (2015) also found that β_4 is significantly priced in Australian market as well. Lee (2011) demonstrated that β_4 or depressed effect of wealth is prominent liquidity risk among all the individual liquidity risks including liquidity commonality and flight to liquidity. Butt and Virk (2015) and Butt (2015) investigated that depressed wealth effect has not been priced in stock market of Finnish during time period 1994-2009.

The current study also found a large number of significant positive coefficients of β_4 in India as compared to other equity Asian markets and contradicts with the assertion proposed by Acharya and Pedersen (2005). Amihud et al. (2015) argued that illiquidity caused unexpectedly affects the expected equity return negatively, but at the same time increase the relative demand of liquid securities that lead to mitigate the decline in the prices of equity securities. Therefore there is a gray area subsist in LCAPM theory which needs to be addressed that β_4 may be significant with positive sign in stock markets.

LCAPM theory only discuss negative relationship between β_4 and excess equity returns but the current study shows the traces of positive association between β_4 and excess equity returns and differ from the previous researches conducted in the finance literature of liquidity. The current study also wants to see that LCAPM theory proposed by Acharya and Pedersen (2005) can be employed in Asian markets in its original form or needs some improvement. The result showed some gray area that needs to be addressed in the theory for its better implication.

TABLE 4.53: Results of Depressed Wealth Effect Beta (β_4) in Asian Countries.

Asian Countries	**Amihud Measure (AM)**	**Amivest Liquidity (AL)**	**Hui-Heubel Liquidity Ratio (HHLR)**	**Market Efficiency Coefficient (MEC)**	**Zero Return (ZR)**	**Turnover Ratio (TR)**	**Roll Estimator (RE)**
Japan	-0.028***	-0.001	0.089	-0.084***	0.049***	-0.001	-0.091***
	(-3.86)	(-0.02)	(0.10)	(-7.25)	(3.24)	(-0.02)	(-6.51)
Pakistan	-0.0445	-0.001	-0.002***	0.008	-0.036**	0.107**	0.230**
	(-0.02)	(-0.02)	(-2.51)	(1.01)	(-1.91)	(2.33)	(1.86)
India	0.180***	-0.026***	0.370***	0.047**	0.077***	0.875***	4.09***
	(4.63)	(-3.21)	(3.37)	(2.50)	(5.57)	(4.92)	(2.86)
China	0.091***	-1.783***	0.007	0.063***	-0.108***	-0.080***	-0.234***
	(3.19)	(-3.37)	(0.49)	(2.89)	(-4.83)	(-6.86)	(-4.53)
Thailand	-0.025**	0.500	0.004	-0.012	0.407***	-0.101***	0.324***
	(-2.28)	(1.60)	(1.82)	(-0.71)	(5.45)	(-7.93)	(2.79)

Fourth and fifth hypotheses of the research are based upon aggregate illiquidity risk β_5 and total systematic risks β_6. First aggregate liquidity risks which is the combination of all individual liquidity risks commonality beta risk, flight to liquidity risk and depressed wealth risk are discussed first.

In Japan positive significant coefficients (0.025, 0.247, 0.011 and 0.100) of total liquidity risks show β_5 priced with respect to Amihud measure, market efficiency coefficient, zero return and Roll estimator. With respect to other illiquidity measures β_5 is significant with negative sign indicating constrained risk premium exist in Tokyo stock exchange of Japan.

In Pakistan positive and negative significant coefficients of β_5 (-0.11, -0.24, 0.21, -0.06, 0.004) indicate combined liquidity risks are also priced in Pakistan stock exchange in perspective to Amihud ratio, Amivest liquidity, market efficiency coefficient, turnover and Roll estimator.

All illiquidity measures including price impact, market breadth and depth and transaction cost show significant coefficients of β_5 in National stock exchange of India and Shenzhen stock exchange of China.

Similarly Thailand also found positive and negative significant coefficients of β_5 in the context of illiquidity measures Amihud measure, Amivest liquidity, market efficiency, zero return and turnover.

The results of the study accept the fourth hypothesis of the study that aggregate liquidity risks are priced in Asian equity markets during 2005-2015 and support the Acharya and Pedersen (2005) that investors are compensated through illiquidity risk premium when they bear illiquidity risks.

The results of the study are in line with Vu et al.(2015) and Kim and Lee (2014). Saad and Samet (2015) investigated illiquidity premium of .73% in developed market.

Hagstromer et al (2013) also revealed the pricing of illiquidity risks in U.S stock market and found premium of illiquidity risk from 0.46% to 0.83% depending upon LCAPM specifications of Acharya and Pedersen (2005).

TABLE 4.54: Results of Aggregate Liquidity Beta (β_5) in Asian Countries.

Asian Countries	**Amihud Measure (AM)**	**Amivest Liquidity (AL)**	**Hui-Heubel Liquidity Ratio (HHLR)**	**Market Efficiency Coefficient (MEC)**	**Zero Return (ZR)**	**Turnover Ratio (TR)**	**Roll Estimator (RE)**
Japan	0.025***	-0.244***	-0.003	0.247***	0.011**	-0.244***	0.100***
	(7.73)	(-3.16)	(-0.81)	(7.44)	(2.05)	(-3.16)	(2.97)
Pakistan	-0.111	-0.244***	0.001	0.212***	0.003	-0.066***	0.004***
	(-1.88)	(-3.16)	(1.12)	(4.42)	0.87	(-2.69)	(2.81)
India	0.122***	0.029*	-0.069***	0.029*	-0.120***	-0.417***	-0.084***
	(4.43)	(1.68)	(-3.04)	(1.65)	(-3.81)	(-3.50)	(-5.46)
China	-0.046***	0.075***	0.068***	-0.100**	-0.390***	0.021**	-0.043*
	(-4.97)	(4.09)	(6.51)	(-2.35)	(-8.37)	(2.41)	(-1.89)
Thailand	0.031**	0.151***	0.002	-0.064*	-0.361***	-0.255***	0.001
	(2.50)	(4.78)	(1.42)	(-1.82)	(-7.70)	(-8.94)	(0.03)

Total systematic risk β_6 is the combination of liquidity risks and market risk. It has been analyzed in Asian equity markets to test the sixth hypothesis of the LCAPM theory of Acharya and Pedersen (2005). The positive significant coefficients (0.016, 0.017, 0.298, 0.047, 0.097) of β_6 in Japan as compared to negative significant coefficients (-0.272, -0.272) indicate strongly pricing of liquidity risk in Japan including market risk. Pakistan and China contain equal significant positive and negative coefficients of β_6. Positive significant coefficients of β_6 in Pakistan exist (0.263, 0.029, 0.004) due to illiquidity measures market efficiency coefficient, turnover and Roll estimator. On the other hand Amihud measure, Amivest liquidity and Hui-Heubel liquidity ratio show negative significant coefficients of β_6 (-0.04, 0.27, 0.09) in Pakistan stock exchange during 2005-2015. Results of the study indicate systematic risks are strongly priced in Pakistan equity market with respect to specific illiquidity measures. Like Pakistan similar result with respect to β_6 are found in Shenzhen stock exchange. Amihud measure, Zero return and Roll estimator show negative significant coefficients of β_6 (-0.045, -0.349, -0.036). Amivest liquidity, Hui-Heubel liquidity ratio and turnover show positive significant coefficients of β_6 (0.067, 0.068, 0.021). It means in China equity market aggregate systematic risk are strongly as well as weakly priced during sample period (2005-2015). In Thailand Amihud ratio and Amivest liquidity show positive significant coefficients of β_6 (0.029, 0.185) and zero return and turnover indicate negative significant coefficients of β_6 (-0.388,-0.188). Like Pakitan and China, Thailand also show equally significant positive and negative coefficients of β_6 predicting total systematic risk is weakly priced to some specific illiquidity measure and the opportunity for strongly pricing of liquidity risks including market risk also subsist in stock exchange of Thailand for investors.

India show less positive significant coefficients of β_6 as compared to negative significant coefficients. The negative significant coefficients of β_6 (-0.072, -0.071, -0.253, -0.074) in India with respect to illiquidity measures Hui-Heubel liquidity ratio, zero return, turnover and Roll estimator relative to positive significant coefficients of (0.124, 0.033) in the context of Amihud measure and Amivest liquidity reveal that total systematic risk is weakly priced in Asian equity market of India.

A large number of positive and negative significant coefficients of β_6 accept the fifth hypothesis of the study that pricing of aggregate systematic risk exist in stock exchanges of Asia during (2005-2015).

TABLE 4.55: Results of Aggregate Systematic Risk (β_6) in Asian Countries.

Asian Countries	**Amihud Measure (AM)**	**Amivest Liquidity (AL)**	**Hui-Heubel Liquidity Ratio (HHLR)**	**Market Efficiency Coefficient (MEC)**	**Zero Return (ZR)**	**Turnover Ratio (TR)**	**Roll Estimator (RE)**
Japan	0.016***	-0.272***	0.017***	0.298***	0.047***	-0.272***	0.097***
	(5.21)	(-3.67)	(6.30)	(9.12)	(4.02)	(-3.67)	(2.91)
Pakistan	-0.043*	-0.272***	-0.930***	0.263***	0.001	0.029***	0.004***
	(-1.79)	(-3.67)	(-2.34)	(5.67)	(0.43)	(2.83)	(2.57)
India	0.124***	0.033***	-0.072***	0.016	-0.071***	-0.253***	-0.074***
	(4.43)	(2.36)	(-3.20)	(0.83)	(-2.34)	(-2.77)	(-5.02)
China	-0.045***	0.067***	0.068***	0.014***	-0.349***	0.021**	-0.036*
	(-4.81)	(3.52)	(6.50)	(1.58)	(-7.29)	(2.51)	(-1.82)
Thailand	0.029***	0.185***	0.001	-0.018	-0.388***	-0.188***	0.001
	(2.94)	(6.95)	(0.05)	(-0.57)	(-6.58)	(-8.21)	(0.11)

As far as firm size and momentum is concerned in seven LCAPM specifications in the context of each liquidity measure, the study found that firm size and momentum are strongly priced in Pakistan and China. In case of India least momentum and firm size anomaly have been observed in the context of all illiquidity measures. It means firm size effect does not exist in Indian stock market and there is no contribution of previous return in predicting future returns in this financial market. In Japan and Thailand firm size is weakly priced in their equities as compared to momentum. The results of the study are in contrast with the study of Vu et al.(2015) who found strong firm size impact on the equities of Australian stock exchange as compared to momentum impact.

Results of the study found different illiquidity premiums with respect to different illiquidity measures. Investors focus different illiquidity measures depending upon the type of investment. Institutional investors might be interested in the results of price impact measures of illiquidity because they usually execute large transaction. Price impact illiquidity measures the response of change in price with respect to volume. Similarly institutional investors also focus the turnover because they are more concerned about the resiliency, breadth and depth aspects of liquidity.

Individual investors consider cost of single trade while designing their investment strategies. Roll estimator is a barometer for measuring the transaction cost feature in emerging markets. The results of Roll estimator are more important for individual investors. Transaction cost measure has an influence on tightness of market.

The current study has tested the unconditional version of LCAPM model similar to Lee (2011) and Vu et al.(2015) in Asian stock markets including Japan, Pakistan, India, China and Thialand. Among these Japan is a developed market of Asia and the remaining Asian markets belong to emerging markets. Previous researches of Lee (2011) and Vu et al.(2015) empirically tested the unconditional version of LCAPM model proposed by Acharya and Pedersen (2005) in developed markets of U.S and Australian stock market only. The current study is different from the previous ones in the sense that it attempted to empirically test the LCAPM model in emerging and developed markets. Butt (2015) and Butt and Virk (2015)

also tested unconditional version of LCAPM model in emerging Finnish market. Moreover Hirvonen (2016) examined conditional LCAPM model and contradicts with the current study. Moreover Butt and Virk discussed two illiquidity proxies Amihud ratio and spread to analyze illiquidity in this financial market. The current study has been done on large scale and taken multiple proxies for analyzing illiquidity in the context of LCAPM specifications. The current study used low frequency measures for measuring illiquidity in Asian stock exchanges because high frequency measures are not maintained in emerging markets and contradicts with the study of Lee (2011) who used high frequency data for illiquidity measures in developed market. The theory of LCAPM model is based upon developed stock market. Therefore LCAPM assertions based upon Chordia et al.(2001), Pastor and Stambaugh (2003) and Acharya and Pedersen (2005) are found in their original form in developed market but in contrast to developed market the features of emerging markets are different and the current study found some contrasting results against the theory that concludes LCAPM in original form could not be found in Asian market. Even some liquidity measures showed contrasting results of LCAPM in developed market Japan also. Therefore gray area subsist that need to be addressed in LCAPM model for its better implication. Saad and Samet (2015) measured illiquidity risks due to change in macro economic factors and give a new direction for future dimension of research. Butt and Virk (2015) pointed out in their study that choice of liquidity measures matters a lot for pricing of depressed wealth effect and this effect may be more dimensional. The liquidity risks can be further analyzed in Asian markets by using common component of multiple illiquidity measures in LCAPM. For instance, Kim and Lee (2014) took eight different illiquidity proxies and derived their common component for the estimation of LCAPM. Their findings show not only the pricing of liquidity and systematic risks but also demonstrate common as well as systematic component across the illiquidity measures. The future study could be done in Asian stock markets by using common component method. This will eliminate the noise across the illiquidity proxies as well and measure liquidity risk more accurately. Acharya and

Pedersen (2005) fixed the holding period for the estimation of LCAPM. The current study also fixed the holding period to one month because monthly figures are used for the computation of illiquidity cost. The average holding period of one month is the strict assumption of this model. The conditional LCAPM incorporates average holding period along with time variation. In conditional LCAPM average holding period is not fixed. Hagstromer et al.(2013) have used conditional LCAPM model in emerging market by using reciprocal of yearly turnover as average holding period. Conditional LCAPM model could also be estimated not only in Asian stock markets but globally as well.

Chapter 5

Conclusion and Recommendations

5.1 Conclusion

The purpose of current study is to investigate the pricing of liquidity risks in Asian markets. Liquidity adjusted capital asset pricing model proposed by Acharya and Pedersen (2005) has been empirically tested to analyze the various channels of liquidity risks and illiquidity level. Moreover the study wants to investigate that theoretical assertions, proposed by Chordia et al.(2001), Pastor and Stambaugh (2003) and Acharya and Pedersen (2005) in Liquidity adjusted capital asset pricing model, can be employed in their original form in Asian stock markets including Japan, Pakistan, India, China and Thailand during 2005-2015. Liquidity has multiple features breadth, depth, resiliency, transaction cost and timing. Different measures for illiquidity have been used in the study to capture various dimensions of liquidity. Amihud measure, Amivest liquidity, Hui-Heubel liquidity ratio, market efficiency coefficient and zero return are the price impact illiquidity measures that capture the market breadth and resiliency of liquidity in financial market. Turnover is used to encounter the market depth and breadth of liquidity in stock exchanges of Asia. Roll estimator is used to measure the transaction cost of equities that grasp the market tightness and resiliency of liquidity in Asian stock

markets. However there is no single measure that unequivocally measures all aspects of liquidity including tightness, immediacy, depth, breadth and resiliency. Another purpose of the current study is to analyze either multidimensional illiquidity is priced in Asian stock markets or not. The questions asked in the current study are; 1) Are different channels of liquidity risks including commonality in liquidity, flight to liquidity and depressed wealth effect priced in Asian stock markets? 2) Are aggregate liquidity risks and systematic risks priced in financial markets of Asia? 3) Is illiquidity level of stock affect excess return in Asian stock markets? 4) Does LCAPM model apply in Asian markets in its original form? 5) Does different dimensions of liquidity as liquidity risk are priced in Asian markets? 6) Does the relationship between liquidity risk and equity returns being affected by different illiquidity measures?

In line with Lee (2011) and Vu et al.(2015) the current study empirically tested the unconditional version of liquidity adjusted capital asset pricing model of Acharya and Pedersen (2005) but it is different from the previous ones in the sense that multiple illiquidity measures are used to analyze illiquidity risk's channels at individual and aggregate level in emerging and developed markets. The LCAPM theory originated from developed market; the study has investigated that developed market theory can be employed in its original form in emerging market or some gray area exist in that theory for its better implication. Moreover previous studies used high frequency data in developed market to analyze illiquidity risks in developed markets. The current study used low frequency illiquidity measures because high frequency data is not maintained in emerging markets. The current study empirically tested LCAPM model in more than one country at the same time in contrast to previous studies. The scope of the current study is wider as compared to others because multiple proxies of illiquidity measures capturing different aspects of illiquidity are used to analyze LCAPM model in five countries including developed and emerging during the sample period of ten years starting from June 2005 and ends at July 2015 for first time. Moreover the study has identified the gray area in LCAPM theory that needs to be addressed for its better implication in developed and emerging markets.

The current study followed the Dunne et al.(2011) and Papavassiliou (2013) sub sampling technique and used the continuous listed stocks of indexes from 2005-2015 in Asian stock markets including Japan, Pakistan, India, China and Thailand. To mitigate the measurement errors betas of LCAPM model are computed at portfolio level and portfolio betas are allocated to individual stocks of respective portfolio. Results of the study has identified that illiquidity level affects the stock returns positively or negatively in all Asian stock markets indicating multi dimensional liquidity exist in Asian stock markets and support the theory of Amihud and Mendelsen (1986).In Japan Positive association between level of liquidity and excess returns is observed where as China and Pakistan have negative influence of level of liquidity on equities. In other emerging markets including India and Thailand level of liquidity is weakly priced in these markets. Less number of significant coefficients of level of liquidity has been observed in the financial markets of India and Thailand. The negative association between liquidity level and equity return in China and Pakistan indicates that investors prefer short term trading and pay premium for liquid stocks as compared to illiquid premium in illiquid stocks. The results of the study shows that short term investor who want to liquidate their positions quickly may invest in China and Pakistan stock market.

Liquidity commonality, the first individual illiquidity risk is significantly positive with respect to some liquidity measures. Number of positive significant coefficients of liquidity commonality in Japan is more as compared to Pakistan, India, China and Thailand. The negative effect of Flight to liquidity effect exists in. Japan and China. In India contrasting results with respect to Pastor and Stambaugh (2003) assertion has been observed and found significantly positive flight to liquidity beta with respect to Amihud measure, zero return, and turnover and Roll estimator. In Thailand a mixed trend has been observed in the context of flight to liquidity risk. Positive effect of flight to liquidity beta has not been seen in Pakistan. Depressed wealth effect beta is weakly priced in India and strongly priced in China as compared to other financial markets.

Aggregate liquidity and systematic risk are negatively and positively priced in all Asian stock markets according to LCAPM theory. The number of significant

coefficients of individual and aggregate illiquidity betas concludes the implementation of LCAPM theory in emerging and developed markets and accepts all the hypotheses of the study. The study infers that investors in these market pay premium for those stocks whose liquidity is not affected in poor return market conditions. Wealth shocks are hedged by the investors through paying premium for liquid stocks in financial markets and are compensated in Asian markets when they bear the risk of reduction in wealth. Similarly Investors are compensated for flight to liquidity and liquidity commonality risk in these markets.

Contrasting results including negative liquidity beta, positive flight to liquidity beta and positive depressed wealth beta have also observed in these financial markets. The significant betas with opposite side infer that LCAPM theory needs some modification for its better implementation in financial markets.

The study has found some reasons for betas with opposite signs in financial markets. Firstly, in emerging market features like asymmetric information, non transparent trading, market inefficiency and noise trading exist. Therefore the stocks whose liquidity decreases with market illiquidity do not have prices that are more receptive to market liquidity in emerging markets. Therefore negative equity returns result. Moreover co-movement between return commonality and liquidity commonality usually exist at the same time in developed markets as compared to emerging markets (Clark 2008). This suggests that negatively significant liquidity commonality may exist in emerging markets. Secondly, addition to that impact of illiquidity in emerging market is more that lead to increase in systematic risk. Thirdly, market returns are lowered due to unexpected market illiquidity but when high illiquidity is realized it will create expected liquidity that will lead to increase the excess returns (Minovic and Zivkovic 2010). Amihud et al.(2015) argued that illiquidity caused unexpectedly affects the expected equity return negatively, but at the same time increase the relative demand of liquid securities that lead to mitigate the decline in the prices of equity securities.

On the basis of these reason it is suggested that LCAPM theory should include negative liquidity commonality, positive flight to liquidity beta and positive depressed wealth effect propositions on equity returns for its better implementation

in financial markets.

The results of the study are sensitive to liquidity measures used in the study and different liquidity premium exist with respect to different liquidity measures. It may help different group of investors depending upon the type of investment. Institutional investors might be interested in the results of price impact measures of illiquidity because they usually execute large transaction. Price impact illiquidity measures the response of change in price with respect to volume. Similarly institutional investors also focus the turnover because they are more concerned about the resiliency, breadth and depth aspects of liquidity.

Individual investors consider cost of single trade while designing their investment strategies. Roll estimator is a barometer for measuring the transaction cost feature in emerging markets. The results of Roll estimator are more important for individual investors. Transaction cost measure has an influence on tightness of market. The negative liquidity commonality in financial markets indicates that liquidity risk is persistent due to asymmetric information, non transparent and noise trading the results of the study also helps the regulating authorities to develop the code of conduct for controlling shocks in order to make the financial market to be well efficient and well functioning.

5.2 Recommendations

The study on liquidity risks and asset pricing in Asian countries has following recommendations.

- Study suggests that investor should incorporate different channels of liquidity risks such as commonality in liquidity, flight to liquidity and depressed wealth effect of liquidity in designing portfolios for the optimization of portfolio return.
- The study found different illiquidity premiums with respect to different illiquidity measures. Investors should focus different illiquidity measures depending upon the type of investment. Institutional investors usually execute

large transaction. Therefore they should consider price impact illiquidity factors to measure the response of change in price with respect to volume where as individual investors or short term investors should consider cost of single trade while designing their investment strategies.

- Liquidity shocks affect the proper functioning of financial market especially shocks in commonality in liquidity can trigger the financial crises. Therefore regulators and policy makers should design policies so that systematic shocks can be absorbed in a short span to attract large number of buyers and sellers.

- The study found that liquidity risks are priced in selected Asian countries. Therefore global investors should invest in stocks of Pakistan, China, India, Thailand and Japan in order to enhance their return and diversification.

5.3 Future Directions

Since limited work is conducted in the context of illiquidity risks and its associated channels including commonality in liquidity, flight to liquidity and depressed wealth effect. The current study provides the direction for future research.

- The conditional version of LCAPM model has not been tested by using multiple measures of liquidity. Therefore a future research can be conducted and time variation aspects can also be studied.

- In order to eliminate noise among illiquidity measures common as well as systematic component across the illiquidity measures are determined. The future study could be done in Asian stock markets by using common component method. This will eliminate the noise across the illiquidity proxies and measure liquidity risk more accurately.

- As no research is able to explain the particular phenomena by including every evidence therefore future research can be done in order to verify the results of present study and try to find out other justifications that are responsible for

the results against the LCAPM theory proposed by Acharya and Pedersen (2005).

- A liquidity score that captures all the liquidity aspects should be designed for future study. The co-movement between market liquidity and market return should be added in the LCAPM model to determine return commonality with liquidity commonality for future research.

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Appendix

TABLE A1: Augmented Dickey Fuller Test for Stock Returns, Illiquidity Series, Firm size and Momentum.

Country	Variables	T-statistic	Probability
Pakistan	Stock Returns	4.042	0.000
	Amihud Ratio	0.099	0.921
	Amivest Liquidity	-1.222	0.222
	Hui_Heubel Liquidity Ratio	-1.439	0.151
	Zero Return	0.555	0.579
	Market Efficiency coefficient	-0.120	0.905
	Turnover Ratio	-0.905	0.368
	Roll Estimator	0.249	0.803
	Firm sIze	-3.932	0.000
	Momentum	-4.230	0.000
Japan	Stock Returns	2.890	0.040
	Amihud Ratio	1.240	0.273
	Amivest Liquidity	1.393	0.167
	Hui_Heubel Liquidity Ratio	0.125	0.901
	Zero Return	-1.520	0.520
	Market Efficiency coefficient	1.306	0.194
	Turnover Ratio	-1.193	0.676
	Roll Estimator	-0.206	0.838
	Firm sIze	5.630	0.000
	Momentum	3.049	0.003

China	Stock Returns	-2.330	0.022
	Amihud Ratio	-2.465	0.127
	Amivest Liquidity	-0.095	0.925
	Hui_Heubel Liquidity Ratio	-2.528	0.112
	Zero Return	1.010	0.315
	Market Efficiency coefficient	0.776	0.440
	Turnover Ratio	0.584	0.561
	Roll Estimator	1.084	0.144
	Firm sIze	2.638	0.010
	Momentum	-2.465	0.016
India	Stock Returns	4.990	0.000
	Amihud Ratio	0.320	0.740
	Amivest Liquidity	1.200	0.230
	Hui_Heubel Liquidity Ratio	0.250	0.800
	Zero Return	-1.570	0.490
	Market Efficiency coefficient	0.460	0.640
	Turnover Ratio	-1.130	0.250
	Roll Estimator	-2.280	0.170
	Firm sIze	8.660	0.000
	Momentum	-2.800	0.000
Thailand	Stock Returns	-2.820	0.005
	Amihud Ratio	-0.868	0.387
	Amivest Liquidity	-0.763	0.447
	Hui_Heubel Liquidity Ratio	-0.345	0.731
	Zero Return	0.882	0.380
	Market Efficiency coefficient	1.010	0.315
	Turnover Ratio	1.162	0.239
	Roll Estimator	0.671	0.502
	Firm sIze	4.042	0.000
	Momentum	-8.247	0.000