The Role of Flight to Liquidity in Explaining Excess Stock Return: An Evidence from Pakistani Equity Market

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CERTIFICATE

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Dedicated to my Family and Friends

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Abstract

This study examines the dynamics and drivers of Flight to liquidity (FTL) phenomena in context of Pakistani equity market from 2004 to 2018. This study use different proxies of liquidity e.g (roll estimator, turnover rate, Percentage of zero returns Amihud illiquidity (2002), modified form of Amihud (2002), and volume) rather than using a single measure, because a single proxy of liquidity cannot capture the all aspects of liquidity (Amihud, Hameed, Kang, & Zhang, 2015). This study provides an insight about the behavior of liquidity and excess stock return during crises period. Furthermore, liquidity is divided into expected and unexpected illiquidity and analyze its impact on excess stock return. The results indicate that unexpected illiquidity is statistically significant which reveal that there is a probability that crisis prevailing in the market. Moreover, this study also analyzes the role of financial crisis period in explaining excess return at time t and time t+1. The empirical analysis suggests that crisis period statistically significant effect excess stock return during and after crisis period. These results indicate that the existence of "FTL" phenomenon is there in the stock markets during financial crisis period. The study suggests that investors can reallocate their portfolio and make better informed decision.

Keywords: Flight to liquidity, Stock return, Financial crisis, Pakistani equity market, investors.

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Chapter 1

Introduction

Flight to liquidity (FTL) is an ongoing debate in academic literature and empirical findings document the inconclusive evidence. The academicians and investors have emphasized the importance of FTL occurrence and empirically investigated that how it can be addressed (Acharya & Pedersen, 2005). The FTL is a phenomenon which arises during crisis period when market participants sell less liquid stocks (perceiving high-risk assets) and buy highly liquid stocks (perceiving low-risk assets) based on their perception. Such a situation where investors prefer to buy liquid and sell illiquid stocks creates panic and leads towards a crisis or stock market crash.

In times of economic distress, it has mainly observed that investors reallocate their investments and form new portfolios based on less risk with more liquidity and this phenomenon is commonly referred to as a FTL (Beber, Brandt, & Kenneth, 2008). During the last couple of decades, the FTL phenomenon has been observed in the world's financial markets. Amihud and Mendelson (1986) first time investigate the illiquidity and stock returns. The objective to get higher return can be fulfilled by investing in stocks that are traded more frequently. Liquidity shocks compel the investor to include more liquid stocks in their portfolio.

In the finance literature, liquidity generally refers to the ease of converting the business assets into cash without discounting (Brennan, Chordia, & Subrahmanyam, 2012). Although the definition is the same for stock market liquidity and has also considered the buying and selling of financial assets without incurring any kind of change in asset's price or transaction cost. At the same time investor are also looking for a higher rate of return along with higher liquidity for their investment. Grossman, (1976) states that investors allocate a major portion of the cost for collecting information to optimally allocate resources. Ho and Michaely, (1988)

argue that small firms are less efficient and costlier in the acquisition of information as compare to large and old firms. It is also important to unfold how market illiquidity affects stock returns by considering size to capture the attention of investors.

During the stock market crashes an increase in illiquidity induce the FTL phenomena to the market and the price of less liquid stocks declines more as compare to the more liquid stocks (Li, Zhang, & Li, 2019). The same thing happens in Pakistani equity market during August 2008 and the crash has resulted in a loss of billions of rupees to investors where no one can escape from the damage and regulator intervene to freeze the market. The price limit virtually close the market exists door and the fear of liquidity makes stock liquidity to zero that results in zero volume days.[1] Liquidity plays a significant role in an emerging economy like Pakistan because a highly liquid market results in inefficient allocations and this risk is negatively priced in stocks.

The study has contributed in five ways to the Pakistani equity market. First, the study has examined liquidity and returns relationship by using panel estimations. Secondly, the study has use various dimensions of liquidity for robustness rather than using a single proxy, because a single proxy of liquidity is not able to capture all aspects of the market (Amihud et all, 2015). Thirdly, this study compare the CAPM model with the additional liquidity factor in a characteristic based model (Haugen & Baker, 1996). Fourthly, the study examines the moderating role of size and liquidity between stock liquidity and excess return in the presence of size. Finally, this study has analyzed the effect of FTL during and after the crisis and check how this effect lasts after the crisis.

[1] The situation has created panic in the market due to noise trading and stock market liquidity fluctuated. The regulator intervenes and the "floor" remains in place for 108 days from Aug 27, 2008, to Dec 15, 2008. (SECP report on 2008 stock market crashes Published in Dawn, July 26th,2015)

1.1 Problem Identification and Problem Statement

FTL causes financial instability in the market and investor's expectations vary during market downturn which compels the investors towards risk-averse behavior (Chang & Hsueh, 2013). With the change in the investor's perception about the risk during the financial crises, the demand for the stocks also change and results in higher price spreads. As the price spread increases, the investor looks toward safe assets by decreasing their exposure to risky assets. The arrival of the financial crisis is often uncertain; thus an investor may have no clue that when the market will downturn. Lee (2011) suggest the investors to consider liquidity in portfolio management because it affects the performance of investment. In the financial world, the illiquid conditions would create panic in the stock market and during this situation, investor reallocate their portfolio. To resolve this above-stated issue "this study will address the phenomena of inducing FTL into the return dynamic from an investor point of view by looking at the determinants of excess return during the crisis".

1.2 Research Question

This study provides the answer of following questions:

- Whether the expected liquidity and unexpected liquidity risk influence excess stock returns?
- Whether characteristics based model explain the FTL phenomena?
- How does size moderate with liquidity in explaining the relationship of liquidity and excess stock return?
- Does liquidity effect remain same during the crisis and rest of the period?
- How does the crisis period moderate with liquidity in explaining the relationship of liquidity and excess stock return?

1.3 Objective of the study

This study aims to observe the phenomena of FTL on excess stock return from Pakistani equity market prospective. The objectives of the study are as follows:

- To examine the impact of FTL on excess stock return using expected and unexpected liquidity.
- To investigate the moderating role of size and crisis with liquidity in explaining excess stock return.
- To examine how excess returns are affected during the crisis period.

1.4 Significance of the study

Literature suggests that FTL Phenomena occur in the equity market when illiquidity increase. An equity market is called as a liquid market when it has a number of buy and sells orders, low transactions and less volatility in prices. The asymmetry and uncertainty in the stock market also create uncertainty in the execution of the stock orders. The uncertainty will add additional risk for investors and in such a scenario, investors will demand additional return or premium due to their added risk. It is referred as a liquidity premium.

Kumar and Misra (2019) have argued that as compared to developed markets, emerging markets have higher risks affiliated with their financial markets. From emerging markets prospective, the stock market crises are important to analyze because emerging markets are normally characterized by higher stock returns volatility (Bekaert & Harvey, 1997). Pakistan is an emerging economy and faces the equity market crash in the last decades. After the recent 2008 financial crisis liquidity risk is the most dreaded financial risk of all times in Pakistani equity market. When 2008 instance happen the crisis was triggered by highly geared investments whose value drop sharply and this situation compel the financial institution to sell their illiquid assets to meet margin calls as well as day to day transactions. Most of the institutional investors and financial institutions reallocate their portfolios during crisis time

from more risky illiquid assets towards less risky and more liquid assets (Marozva, 2019). Later on the financial crisis motivated researcher to explore the role liquidity in equity markets and predominantly the association among the liquidity and returns. Further the study provides additional insight and evidence in the FTL domain and bridges the gap in the context of FTL phenomena.

This study focus on the exploration of FTL phenomena of the Pakistani equity markets. The finding of the study are beneficial for investors and other fields of finance. This study provides insight about the behavior of investor during the crisis and will help regulators and policymakers to make a better-informed decision aimed to stabilize the financial market. This study will also help investors to adjust their trading decision and devise investment strategy in the context of FTL phenomena.

1.5 Gaps in the Literature

This study is an attempt to fill the gap by capturing the pattern of the stock market during crisis and after the crisis in the domain of FTL. Most of the empirical studies exploring the liquidity risk in developed market and different researcher exhibit that the effect of liquidity risk in an emerging market may be differ as compared to develop market due to their order-driven market structure, roles and rules of private investor such as in Pakistani equity market. Numerous studies are conducted for exploration the relationship between liquidity risk and stock returns in Pakistani equity market i.e. (Rehman & Mangla, 2018; Sadaqat & Butt, 2017; Saeed & Hassan, 2018). From the prospective of Pakistani equity market Saeed and Hassan (2018) examine FTL in asset pricing framework. Basically there are two types of models, first is factor-based model which is proposed by Fama and French (1993,1996) and second is characteristics base model which is proposed by (Daniel & Titman, 1997).

This study compares the CAPM model with the additional liquidity factor in characteristic based model. The current study divide liquidity into expected and unexpected

liquidity and analyze its impact on excess stock return. The liquidity covers at least five dimensions (asymmetric information, trading volume, price impact, trading speed, and transaction cost) and a single proxy of liquidity in any equity market can't capture all of these dimensions and caused biasness in empirical studies (Amihud et all, 2015). To check the robustness of liquidity this study uses the different dimensions of liquidity e.g. Amihud ratio, percentage of zero returns, turnover rate, Roll estimator and volume trading.

Further the study analyze the moderating role of size and liquidity risk to check the association among the liquidity risk and excess stock return. Large firms are more diversifiable, financially flexible, informationally efficient and less sensitive in risky conditions as compared to small firms. This study also observe the relationship of crisis time and excess stock return. Further, this study analyze the moderating role of financial crisis period and liquidity to check the association among liquidity risk and excess stock return. In time of stock market crash an increase in illiquidity induce the FTL phenomena to the market. Finally, this study examines how the stock returns are affected during the crisis period and whether effects remain in the stock market after crisis period.

1.6 Organization of the study

The current study comprises on five (5) chapter and dissertation is organized as follow: Theoretical and empirical background are discussed in chapter 2. Chapter 3 describes the data collection procedure, variable description, model specification and econometrics model that are used to explore the association between liquidity risk and excess stock return. Chapter 4 provides the detail discussion of data analysis and empirical results. Finally, the chapter 5 discussed the concluding remarks, recommendation and further research direction.

Chapter 2

Literature Review

2.1 Overview of the chapter

This section provides a detailed review, firstly discuss in detail about the history of PSX. Secondly, historical developments and theoretical background of the study that presents the empirical evidence reported by different researchers to show the association between illiquidity risk and stock returns. Thirdly, provides a detail review of literature that will report the relationship of different variables and discuss in detail the different proxies of liquidity that's are used to examine the excess return.

2.2 History of Pakistan Stock exchange market

It has been long debated that Stock market of any country plays a vibrant role in any economy. Like other emerging markets, PSX also has certain pros and cons with several unique characteristics. KSE was established on September 1947 and incorporated on March 10, 1949. At start only 5 companies listed at KSE and the first index was comprised on 50 companies and it is known as KSE 50 index.

The second stock exchange under the Securities and Exchange (SE) Ordinance 1969 was established in 1970 known as Lahore stock exchange. In October 1989 third stock market known has been established in Islamabad named as Islamabad stock exchange. There are no mutual links between these three markets due to trading interfaces, listing criteria, separate management and indexes and it leads toward different conflicts. The government has merged these three markets under the "Demutualization Act" 2012 and named it as Pakistan Stock Exchange Limited (PSX). AS on January 11, 2016 PSX has started its operations and has trading floor in Karachi, Islamabad, and Lahore.

There are total 35 sectors comprises of 548 companies listed in PSX with market cap of Rs. 7,969.817 B as on January 24th, 2020[2] and the listed companies are categories into financial and Non-Financial sectors. Currently, there are five indexes in PSX. In 1991 the KSE 100 index was established and it comprises one hundred firms listed based on their market capitalization. In 1995 the KSE all index was established and it became operative one month after its establishment. In 2005 the KSE-30 index was established in order to provide the investor an overview of PSX. In 2008 PSX introduces KMI 30 index and later on in 2015 the all shares Islamic index was established. The main purpose of KMI 30 is to measure the performance of Shariah compliant equity investment. The KMI 30 serve as a scale for measuring the performance of Shariah compliant equity investment.

In PSX, both individual as well as institutional investors are investing. The total number of institutional investors are 2769 out of which 1886 are foreign institutional investors and 883 are domestic institutional investors along with about 0.22 million retail investors. In In PSX the total number of brokerage houses are 400 and the total number asset management companies are 21. It is among the world's best performing and leading stock markets between 2009 and 2015 and also the best performing Stock Exchange in Asia region. In 2016 it sold 40% strategic shares to a Chinese group of companies for eighty five million dollar.[3] In 2017 it was reclassified as an MSCI new appearing market and also the FTSE classifies it as a secondary emerging market.[4]

[2] http://www.ksestocks.com/MarketIndexes/KSE100

[3] https://en.wikipedia.org › wiki › Pakistan Stock Exchange.

[4] https://www.psx.com.pk › blog.

2.3 Theoretical background

This section reviews the theories related to the study. These theories address this study due to their predominance in the stock market return.

Markowitz (1952) provides a base to modern finance. After Markowitz (1952) contribution the capital asset pricing model (CAPM) are introduced by ((Sharp, (1964) & (Linter, 1965)).Thus, subsequently Basu (1977) Banz (1980) and Fama and French (1992) claim that the differences in average returns can't determine the market return, but also through size of a firm and prior returns. Fama and French narrate that size are the source of information available in prices about the risk and expected return. Fama and French (1992) endorse that character associated to assets performed better than beta and further analyze the size and book to market ratio in order to check the asset performance. Fama and French (1992) argued that the Characteristics model explains excess return by stock characteristic. Later on, the risk based studies of Fama and French (1993, 1996) are criticised by (Daniel & Titman,1997). The study of Daniel and Titman (1997) suggest that the return premiums is not due to the risk factor but simply due to their characterstics. The study assert that it is the chaacterstics of a firm which explain cross-sectional variation in returns.

The relevant literature of market liquidity suggest that the efficient market hypothesis (EMH) is one of the important concept regarding liquidity risk. According to Fama (1970), every new information that is available in the market immediately capture the share prices and conclude that price changes occur because of the new information available in the market. As per Markowitz (1952), the investment decision is only determined on the base of risk and return. But in actual the financial markets are too complex and full of frictions. These frictions in the market are based on market microstructure theory (Cohen, Maier, Schwartz, & Whitcomb, 1986). Further, there are two categories of friction informational friction and real friction. The real friction indicates the shortfall in the organization and have an impact on all

the participant in the market. Stoll, (2000) points out the illiquidity as a form of market friction and investor reallocates their wealth among stock market participants and considers it before making decision

Whereas Amihud and Mendelson (1986) presente the trading cost theory. The trading cost theory proposed that costs associated with the transaction affect the stock prices. They argue that stocks with larger bid-ask spreads, had higher returns and trade associated costs that can either increase or decrease as a result of variations in time of transactional costs. Transaction cost causes the market to be segmented and short term investor hold comparably more liquid stocks as compare to long-term investors. Amihud and Mendelson (1986) argue that the investors who hold their stocks for longer periods can get a premium as a result of illiquidity and that exceeds the expected transaction costs through holding stocks with higher spreads. An investor who holds stock for short period more vulnerable to costs as compared to an investor who holds stock for a long period. Because the short period stocks are transacting on a more frequent basis as compared to longer period stocks.

Asymmetric information also influencing the transaction cost. In a perfect market, it is assumed that all market participants have similar information but in reality all participant have different information and all this happen due to market fact accessibility to investors and transform of information from similar sources is different. It is the main cause of liquidity because the investor who have superior information make better decisions as compared to others who have lack of information. Due to asymmetric information investors who informed, trade only when they can get maximum return. These informed investor buying when they know the stock is undervalued and selling when they know the stock is overvalued (Morck, Yeung, & Yu, 2000).

In a perfect market during the whole trading period, all make participants are present and a buyer has accessibility to all the seller in the market. However, practically the case is

opposite, the agent incurs market participation cost and likes the cost of monitoring moment in the market and additionally agents also incur execution cost per each transaction. This cost creates a significant difference among the buying and selling price of an asset. Others cost such as transaction tax brokerage fee and fee paid to process an order which is associated with transaction cost also affect market liquidity. These costs have a direct effect on trade's return. The presence of these costs creates market frictions in the stock markets thus it can be seen as a determinant of market illiquidity. Market with high transaction costs is less liquid as compared to low exogenous transaction costs (Atkins & Dyl, 1997).

In the context of "Trading quantity theory" Kato and Loewenstein (1995) argue that there are numerous problems associated with transaction costs and differant dimension of liquidity.some of the problem included in that period i.e long periods, costs associated with transacting process. Furthur Karpoff and Walkling (1988) and Bhushan (1994) found that the mostly measures used for liquidity to be inaccurate. Then Easley and O'Hara (1987) introduce the trading quantity theory which looks at the size of a trade at a particular price. Under the trading quantity theory the essential source of liquidity risk is the demand pressure of a stock and it is commonly known as the price impact (Sloman & Kevin, 2007). The price impact with high liquid markets having lesser price impact and has been determined by market liquidity level. The partial information available in the market caused price impact. Sometimes an investor decides to sell or by a large number of stocks and there is a possibility that other investors in the market will perceive that investor has crucial information that is not available to them, which may cause pressure on the stock price. But inefficient market this type of price impact cannot be permanent because prices will adjust due to the demand and supply forces (Hubbard & Obrien, 2009).

The most common measured of trading quantity is the trading volume. This measure has a time dimension advantage since the higher the volume the shorter the time needed to

trade a specific number of shares. Thus, Brennan and Subrahmanyam (1996) argue that the values of volume-related measures should be higher to indicate high liquidity. Furthur Brennan, Chordia, and Subrahmanyam (2012) posisit that the daily trading volume is the one of the most important determinant of liquidity. Trading volume is further extend to the turnover rate and suggest that turnover rate is the more suitable measure of liquidity rather than trading volume. As effeciently the stocks trade without inccuring a cost and time delay the higher the turnover rate. Moreover, theoretically it is inversely related to the returns and bid-ask spreads (Brennan, Chordia, & Subrahmanyam, 2012).

These theories are relevant to the study as they give an insight on liquidity and dimension of liquidity and how liquidity relates to stock returns.

2.4 Review of literature

Several researchers investigate that whether the level of illiquidity affects asset prices. Different proxies of liquidity has been used researcher in order to find out the association of liquidity risk and excess sock return.

Amihud and Mendelson, (1986) intially investigate the relationship of liquidity risk and asset pricing. Furthermore the study analyze the effect of illiquidity (bid-ask spread) on asset pricing. First, the study proposed a model which forecast that high returns are linked with those stocks having high bid-ask spread. The study finds the evidence of clientele effect in model and exhibit that those investors who hold a stock for a longer period having higher bid-ask spread. The study developed model by considering a different type of investor and expected holding period

The first proposition proposed in the study is clientele effect which express that in equilibrium investor hold assets with higher spread for a longer period of time. The second proposition proposed by the study is spread-return relationship and through which the study affirm the growing and concave association among returns and spread. The results of the study reveal a direct association among bid-ask spread and risk-adjusted returns.

The study of Eleswarapu and Reinganum (1993) observe the imapct of seasonal behaviour in context of liquidity risk and stock returns. The study used the bid ask spread as proxy of liquidity and finds a significant effect for the month of January and vice versa for non-January months. The study provides the evidence of seasonal behavior. In contrast the study of Datar, Naik, and Radclife (1998) replicate the study of Amihud and Mendelson (1986) in a different way. The study using the turnover rate as a proxy of liquidity and find the comparable results with the theory of (Amihud & Mendelson, 1986).

The reason suggested by Datar et al., (1998) to use the turnover rate as a proxy of liquidity rather than the bid-ask spread are as follow: 1) it is difficult to obtain the data for a longer period in order to calculate bid-ask spread[5]. 2) The quoted spread is a poor measure for the actual transaction costs faced by investors[6]. The study observes that whether liquidity positively or negatively affects the stock returns. The main focus of the study is to analyze the Proposition 1 and preposition 2 of (Amihud and Mendelson, 1986). The findings suggest that there is a inverse association among the turnover rate and returns. The study also examine the size effect and suggest that size has statistically significant effect on returns. But firms beta has an inverse relationship with return which is contradict with the results of (Eleswarapu & Reinganum, 1993).

Datar et al (1998) empirical findings are inconsistent results with (Eleswarapu and Reinganum,1993). On the basis of results it is concluded that there is a positive association among liquidity proxy and stock returns and the findings are not against the theory of (Amihud

[5] E&R use the average of the bid-ask spread at the beginning and the end of the year as a proxy for the liquidity of a stock through that year).

[6] Peterson and Fialkowski (1994) show that the quoted spread is a poor proxy for the actual transactions costs faced by investors and call for an alternative proxy which may do a better job of capturing the liquidity of an asset.

& Mendelson, 1986). Later on, Eleswarapu (1997) also support the result of Eleswarapu and Reinganum (1993) and suggest that the January effect is significant.

The results of Berkman and Eleswarapu (1998) study are also aligned with the study of (Amihud & Mendelson, 1986). It is observed that the behavior of Bombay Stock Exchange explore the role of short-term traders in explaining the returns and liquidity. The study has find out that short term investor mostly invest in liquid assets. Rouwenhorst (1999) study find contradicting results with Amihud and Mendelson (1986). Rouwenhorst (1999) has examined the liquidity on monthly basis and used turnover rate as proxy of liquidity. Empirical analysis indicate that there is associations between turnover and firm characteristics in contrast the study find there is no evidence of association between turnover rate and returns. The study conclude that holding a stock for long span does not provide any compensation and the results are contradict with the theory of (Amihud & Mendelson, 1986).

Amihud (2002) has observed the relationship among the liquidity and stock returns. In this study a new of illiquidity is used that is the average absolute return to average dollar volume. The findings indicate a direct relationship among expected illiquidity and the excess stock return. Further the study conclude that during unexpected market illiquidity the prices of the stocks are lower as compare to expected illiquidity. The study also insists that the prices of the stock are high during expected illiquidity time period is not because of risk factor but it is due to the liquidity factor prevailing in the market. The study also argues that for smaller firms the liquidity risk is larger as compare to large firms. The study further report that the small firm's returns are higher as compare than large firms returns. Amihud's (2002) findings also support the study of (Amihud & Mendelson, 1986).

The study of Chordia, Subrahmanyam, and Anshuman (2001) use two proxy of liquidity average dollar volume and turnover rate as used by (Datar et al., 1998). The empirical

findings of the study notes that both liquidity proxies inverse association with the expected stock returns. Their results are consistent with theory of (Amihud & Mendelson, 1986).

Later on, Hu (1997) also use the turnover as a proxy of liquidity as used by (Datar et al, 1998). The study explores the liquidity risk in context of Tokyo Stock Exchange and used turnover rate as a proxy of liquidity in order to analyze the impact of turnover on stock returns. The study conclude that there is an inverse associations between turnover rate and expected return. In particular, the empirical results indicate that low expected stocks returns have higher turnover yield the finding are aligned with the study of (Amihud & Mendelson, 1986).

Marshall and Young (2003) find consistent results with the study of Datar et al (1998) and find contradict results with (Amihud & Mendelson, 1986; Eleswarapu & Reinganum, 1993). Marshalla and Young (2003) provides the evidence from Australian Stock market in order to examine the relationship between liquidity (turnover rate) and stock return. The finding of the study does not provide any evidence of the January effect and the liquidity premium is statistically significant for non-January periods. The study used three proxy of liquidity and finds that liquidity is negatively related to return.

A simple theoretical model present by Acharya and Pedersen (2005) has explored that how liquidity risk affect the asset prices and also analyze the commonality in liquidity. The findings of the study provides a unique framework to understand the different sources through which the liquidity risk affect asset prices. Later on, Liu (2006) used percentage of zero volume days as a proxy of liquidity and find out that liquidity is an essential source of priced risk. The study documented the liquidity risk which is not explained by CAPM and three factor model and further provides the evidence relating to market anomalies.

Based on Acharya and Pedersen's (2005) model Saeed and Hassan (2018) provides the evidence of FTL phenomena by analyzing the data of PSX from 2005 to 2015 and strongly support the evidence of FTL risk in PSX. Further the study documented that the FTL

phenomena is priced. The study report that FTL risk in the context of the Amihud ratio and Zero return is negatively priced in PSX. Similarly, the study of Li, Zhang and Li (2019) also use the empirical model of Amihud (2002) and Liu (2006) and explore the FTL phenomena from Chinese stock market. The results show that FTL phenomena are partially explained by this FTL size effect.

Li et al. (2019) investigate the time-series and cross-sectional effect of stock liquidity and further study whether FTL can explain some stock anomalies or not. The findings of the study indicate that expected illiquidity has a direct relationship with excess stock return and FTL partially explains frequent financial anomalies. Barinov, (2020) explore the relationship of turnover with other liquidity variables and emperical analysis suffest that turnover rate is inversely related to liquidity measures. The study conclude that liquidity risk can't explain clearly that why lower returns are forecasted by higher turnover rate. The findings indicate that turnover rate and returns are more affirm for firm having option e.g and it is also point put by volatality factor.

Amihud and Wood, (1990) examine the 1987 financial crisis. The study interpreted in light of he realtionship between liquidity and stock prices and finds that the problems in stock trading and sharp decline in liquidity significantly effect the returns. The findings of the study also documented that the illiquidity problem previaled during crash and afterward had a lasting impact on returns. The main news that lead toward the prolonged decline in stock prices was crash itelf which changed investor perceptions of the liquidity of market.

In the past a number of studies investigate the dynamic relationships between liquidity risk and stock return particularly in the advanced economies e.g U.K, USA, European markets and Japan. Amihud & Mendelson (1986) conclude that liquidity has a direct relationship with returns. Most of the studies of developed as well as emerging market (Datar et al, (1998); Amihud, (2002); Rouwenhorst, (1998); Chordia et al, (2001); Bekaert et al, (2007); Brennan

et al, (1998); Lischewski and Voronkova, (2012); Saeed and Hassan, (2018) find supportive results with the study of Amihud and Mendelson, (1986) and some other find studies find contradict and mixed results with the study of (Amihud & Mendelson, 1986).

2.5 Hypothesis

H1: There is a positive relationship between expected liquidity and excess stock return.

H2: There is a negative relationship between Unexpected liquidity and excess stock return.

H3: The firm size strengthens the relationship of expected liquidity and excess stock return.

H4: The firm size weakens the relationship of unexpected liquidity and excess stock return

H5: The Crisis period increase the relationship of expected liquidity and excess stock return.

H6: The Crisis period decrease the relationship of unexpected liquidity and excess stock return

H7: There is a relationship between crisis time period and excess stock return at time t.

H8: There is a relationship between crisis time and excess stock return at time t+1.

Chapter 3

Data Description and Methodology

This chapter briefly discussed the data collection technique and methods, which are used to explore the association among excess stock return and illiquidity.

3.1 Data Description

3.1.1 Population and sample

The study examines the impact of illiquidity on excess stock return by employing the firm-level data of listed companies at PSX for the period of 15 year from 2004 to 2018. The total number of companies listed at PSX is 554 of which 417 are non-financial companies. The data is collected from the PSX website, Business recorder website, investment.com and State Bank of Pakistan sources.

3.1.1.1 Sample selection criteria

The data for the sample of 122 non-financial companies will be collected by following the below criteria:

- The sample period is from 2004 to 2018. Because in 2004 corporate governance practices are to be followed by listed companies in Pakistan as directed by SECP Pakistan.
- Those firms are part of the sample having data from 2004 to 2018.
- Only those firms included that are must be part of PSX 100 index during the sample period.
- 6 months Treasury bill rates are used as a measure of the risk-free rate.
- The percentage change in the KSE-100 index is used as a proxy of the market return.

3.2 Variables description

3.2.1 Dependent variable

3.2.1.1 Excess stock return

The excess stock return will be used as an experimental variable. The excess stock returns is the difference among annualized individual stock return and annualized market return from the monthly share prices and market index respectively.

Excess stock return= $(\boldsymbol{R_{it} - R_{ft}})$ 3.1

Where, R_{it} = $\boldsymbol{ln}\left[\frac{\boldsymbol{P_{it}}}{\boldsymbol{P_{it-t}}}\right]$, $\boldsymbol{P_{it}}$ Denotes the current stock price and $\boldsymbol{P_{it-1}}$ denotes the previous stock price and $\boldsymbol{R_{ft}}$ is the 6 month risk-free rate

3.2.2 Independent variables

3.2.2.1 Illiquidity

The illiquidity refers to the trading smoothness in the financial market. In this study the volume, turnover rate, trading volume, percentage of zero returns Amihud Ratio and modified form of Amihud ratio are used to measured illiquidity. These proxies are measured by using the daily trading data.

First proxy of liquidity is daily trading volume and it is the average number of share traded in a year. It is measured as follow:

Daily trading volume= Average number of shares trading at day t 3.2

Second, measure is the turnover rate that is the ratio of stock and it reveals that how much shares of a stock are sold on a specific time. Numerous studies measured it by dividing the daily average volume to the number of shares outstanding. Turnover rate is introduced by

Datar et al., (1998). Brennan Huh and Subrahmanyam (2011) insist that turnover rate is a more suitable proxy of liquidity rather than trading volume. It is calculated as follow:

$$\text{Turnover rate}_{it} = \frac{\textbf{Average number of stocks traded at day t}}{\textbf{Shares outstanding at day t}} \quad 3.3$$

The third measure is ILLIQ, which is introduced by (Amihud, 2002). This measure is used to capture the price impact and it is an alternative measurement of illiquidity. Calculation of the measure is as follows:

$$\text{ILLIQ}_{it} = \frac{|\textbf{return}_{it}|}{\textbf{volume}_{it}} \quad 3.4$$

Where, $|\text{return}_{it}|$ denotes daily absolute return on stock I at time t and volume_{it} denotes the daily averaged dollar volume of stock I at time t.

A modified form of Amihud (2002) is used by Brennan, Huh, and Subrahmanyam (2011) in their studies. These studies used turnover rate instead of dollar volume and the formula for this measure is as follows:

$$\text{MODIFIED ILLIQ}_{it} = \textbf{ln}\left(\frac{|\textbf{return}_{it}|}{\textbf{turnover}_{it}}\right) \quad 3.5$$

The fourth measure used in this study is known as Percentage (%) of zero volume days. In the study of Bekaert, Harvey and Lundblad (2007) this proxy is used as a liquidity measure and it is the number of zero return days of security I during time t divided by the number of total trading days of security I for time t. The stock illiquidity has a direct relationship with the percentage of zero volume days. If the percentage of zero volume days increases the stock illiquidity also increase. The High value of zero return days shows that the market is illiquid. The formula of this measure is as follow:

$$\text{ZR} = \frac{\boldsymbol{N_{it}}}{\boldsymbol{T_{it}}} \quad 3.6$$

Where, $\boldsymbol{N_{it}}$ is the number of zero return days of security I during time t and $\boldsymbol{T_{it}}$ denotes the number of total trading days of security I for time t.

The fifth measure of liquidity is roll estimator and this measure is only meaningful in those situation when the sample serial covariance is negative. So, Goyenko and Sarkissian, (2010) proposed the improved version for measuring the transaction cost feature of liquidity. Roll estimator is measured as:

$$Roll = {}_{0}^{2}\sqrt{-\boldsymbol{cov}(\Delta \boldsymbol{P_t}, \Delta \boldsymbol{P_{t-1}})} \qquad \text{When Cov } (\Delta P_t, \Delta P_{t-1}) < 0 \qquad 3.7$$

$$\text{When Cov } (\Delta P_t, \Delta P_{t-1}) \geq 0$$

Where, $-\boldsymbol{cov}$ Denotes the negative covariance between stock prices, $\Delta \mathbf{P_t}$ denotes the change in current stock price and , $\Delta \mathbf{P_{t-1}}$ denotes the change in previous stock price. The negative autocorrelation has been observed between the prices of securities when bounce exists between prices. More bounce in the price causes the high value of roll estimator that shows high transaction cost indicating the market is less liquid and less resilient.

Table 3.1 Summary of illiquidity measures

Measures	Formula	Reference
Volume	Volume=Average number of shares traded at time t	Baruch and Saar (2009).
Turnover rate	$\text{Turnover rate}_{it} = \frac{\text{Average number of shares traded at day t}}{\text{Shares outstanding at day t}}$	Subrahmanyam and Ansuman (2001)
Percentage of zero returns	$ZR=\frac{\boldsymbol{N_{it}}}{\boldsymbol{T_{it}}}$	Bekaert et al. (2007)
Amihud Ratio	$ILLIQ_{it}= \frac{\lvert \mathbf{return_{it}} \rvert}{\mathbf{volume_{it}}}$	Amihud (2000)
Amihud 2 Ratio	$ILLIQ_{it}= \log\left(\frac{\lvert \text{return}_{it} \rvert}{\text{turnover}_{it}}\right)$	Brennan et al. (2011)
Roll estimator	$Roll = {}_{0}^{2}\sqrt{-\boldsymbol{cov}(\Delta \boldsymbol{P_t}, \Delta \boldsymbol{P_{t-1}})}$	Goyenko & Sarkissian, (2010)

3.2.2.2 Size

Size is also called the market capitalization and it is the number of outstanding shares of a firm. In this study size is used as a moderating variable with liquidity risk to check the strength liquidity and excess stock return. It can also be used to divert the attention of investor coverage. It is calculated as follow:

$$size = \boldsymbol{ln}(\boldsymbol{MC})_{\boldsymbol{it}} \qquad 3.8$$

Where, $\boldsymbol{ln(MC)_{it}}$ Denotes the natural log of market capitalization.

3.2.2.3 Excess Market return

It is a measure of how much a fund has under or outperformed the benchmark against which it is compared. This study uses excess market return to confirm the size robustness and measured as follow:

$$Rmrf_t = \mathbf{ln}(\boldsymbol{R_{it} - R_{ft}}) \quad 3.9$$

Where, $\boldsymbol{R_{it}} = \left[\frac{\boldsymbol{P_{it}}}{\boldsymbol{P_{it-1}}}\right]$, $\boldsymbol{P_{it}}$ Denotes the current market price and $\boldsymbol{P_{it-1}}$ denotes the previous market price and $\boldsymbol{R_{ft}}$ is the 6 month risk-free rate

3.2.3.4 Momentum

Momentum is a tool to measure the change in price and it is measured as cumulative return of past twelve months.

$$MOM = \sum \boldsymbol{R_{t12} - R_{t-1}} \quad 3.10$$

Where, $\boldsymbol{R_{t12}}$ denotes the return of the past twelve months and $\boldsymbol{R_{t-1}}$ denotes the return of previous month.

3.2.3.5 Dummy global financial crisis

This study introduces a time t and time t+1 dummy of crisis period of 2008 to test the difference of liquidity during crisis period. The Pakistani equity market are affected during this crisis period and floor remained closed for 108 days.

Table3.2 Summary of independent variables

Variable Name	Formula	Reference
Size	$size = ln(MC)_{it}$	Saeed and Hassan, (2018)
Book to Market ratio	$BMR = \ln(\frac{Total\ shareholder\ equity}{market\ value\ of\ equity})$	Shafana, Rimziya, & Jariya (2013)
Excess Market return ($Rmrf_t$)	$(Rmrf_t) = \ln(R_{it} - R_{ft})$	Li et al. (2019)
Momentum (*Mom*)	$\sum \boldsymbol{R_{t12} - R_{t-1}}$	Saeed and Hassan, (2018)

3.3 Model Specification

This study use the panel data to check the relationship between excess stock return and liquidity.

3.3.1 Panel data analysis

It is also called longitudinal data set and it is define as a data set which has both cross-sectional and time-series dimension. It has two types balanced and unbalanced panel. A data set is called as a balanced panel data when the data set has the same number of time observations for every individual and variable and vice versa for unbalanced panel data. A simple linear panel model with one independent variable as given by:

$$Y_{it} = \alpha + \beta X_{it} + \mu_{it} \quad 3.11$$

3.3.1.1 Different method of estimation

To analyze the panel data in better way, it is essential to know about the different methods of panel data. These methods are classified into three categories (a) Common constant technique (b) fixed-effect technique (first difference method) and (c) random effect technique.

3.3.1.1.1 Common constant model

In common constant technique the individuals within the measurement set have no unique attributes and no universal effects across time. It is also known as polled OLS method. The form of panel data regression equation is similar to ordinary least square, i.e:

$$Y_{it} = \alpha + \beta X_{it} + \mu_{it} \quad 3.12$$

3.3.1.1.2 Fixed effect model (FE)

In this technique the individuals within the measurement set have a unique attribute that does not vary across time. These attributes of the individual independent variable may or may not be correlated with the dependent variables. It is also called the least-squares dummy

variables (LSDV) method. To check that between common constant technique and fixed effect technique which one is better the standard F -test is used. The fixed effect techniqu is as follow:

$$Y_{it} = \alpha_i + \beta_1 X_{1it} + \beta_2 X_{2it} + \ldots + \beta_k X_{kit} + \mu_{it} \quad 3.13$$

3.3.1.1.3 Random effect model

Another technique used for estimating the panel data is known as random-effects model. The individuals in data set have time constant and unique attributes and that are not correlated with any independent variables. In this technique the difference between intercepts is accommodated for the error-terms of each individual. The main advantage of using this technique is to eliminate heteroscedasticity. This technique is also called the Error Component Model (ECM) or Generalized Least Square (GLS) technique. In general, the random effect method is different from the OLS and fixed effect method because it does not use the principle of OLS but using the principle of maximum likelihood or GLS.

In the random effect method, the error term may be interconnected between times and between individuals or cross-sections. Moreover, in this technique the intercept is assumed as a random variable and there is a difference of intercept for each individual. So in this technique there are two error term components. First is the error term as a whole and second error term is an individual error. In first the error term is the combination of both cross-sectional and time series character and in second error term is a random character of the i-th unit observation and remains at all times. The random effect model is as follow:

$$Y_{it} = \alpha_i + \beta_1 X_{1it} + \beta_2 X_{2it} + \ldots + \beta_k X_{kit} + (V_i + \mu_{it}) \quad 3.14$$

3.3.2 Econometric Model

To test the basic CAPM this study will estimate the following equation

$$E(R_{it} - R_{ft}) \,|\, Rmrf_t) = \alpha_0 + \alpha_1 Rmrf_t + \varepsilon_{it} \quad 3.15$$

In model 3.15, R_{it} is the natural log of returns for stock i at time t, and R_{ft} is the risk free rate in the current period and ε_{it} is the error term. The excess market return is denoted by $Rmrf$.

Fama and French (1992) introduce the size to check the asset performance and argued that character associated with assets performed better than beta. Later on, in Fama and French (1992) factor based model Carhart (1997) further introduces momentum factor. This study further introduce the size, value and momentum factor in model 3.14 with a risk factor.

$$E(R_{it} - R_{ft}) \mid Rmrf_t) = \alpha_0 + \alpha_1 Rmrf_t + \alpha_2 Size_{it} + \alpha_3 MOM_{it} + \varepsilon_{it} \quad 3.16$$

In Model 3.16, $Size_{it}$ denotes the market capitalization of stock i at time t and MOM_{it} denotes the momentum of stock i at time t.

Further, to analyze the impact of illiquidity on excess stock return, this study estimate the following model

$$E(R_{it} - R_{ft}) \mid lnILLIQ_{it}^{E}) = \alpha_0 + \alpha_1 Rmrf_t + \alpha_2 Size_{it} + \alpha_3 MOM_{it} + \alpha_4 lnILLIQ_{it}^{E} \quad 3.17$$

Model 3.17, estimate the effect of illiquidity on stock return. Where $IILIQ_{it}$ denoted Stock illiquidity for each time, and $lnILLIQ_{it}^{E}$ is natural log of expected stock illiquidity for stock i at time t.

$$lnILLIQ_{it} = \alpha_0 + \alpha_4 lnILLIQ_{it-1} + \varepsilon_{it} \quad 3.18$$

Where $lnILLIQ_{it-1}$ is the illiquidity of the previous year for stock i. Mostly investor predicts the current time period illiquidity on the basis of available information in the previous time period($t-1$) and further used forecasting to set the prices and generate a desired return for the time t.

$$lnILLIQ_{it}^{E} = \alpha_0 + \alpha_4 lnILLIQ_{it-1} \quad 3.19$$

At the beginning of time t, the investor determines the future expected illiquidity 0n the basis of information available in the previous time period.

$$E(R_{it} - R_{ft}) \mid lnILLIQ_{it}^{E}) = \alpha_0 + \alpha_1 Rmrf_t + \alpha_2 Size_{it} + \alpha_3 MOM_{it} + \alpha_5 lnILLIQ_{it}^{U} \quad 3.20$$

Where $lnILLIQ_{it}^{U}$ denotes the unexpected illiquidity at time t, and $lnILLIQ_{it}^{U}$ is equal to ε_{it} (residual from model 3.18).

$$R_{it} - R_{ft} = \alpha_0 + \gamma_1 Rmrf_t + \alpha_2 Size_{it} + \alpha_3 MOM_{it} + \alpha_4 lnILLIQ_{it-1} + \alpha_5 lnILLIQ_{it}^{U} + \mu_{it} \quad 3.21$$

Investor set the prices at the start of current period (time t) to generate expected returns for current period. Whereas error term denoted the unexpected excess return.

Further, introducing the moderating role of size and liquidity to check the strength of the relationship between liquidity risk and excess stock return in the presence of size.

$$R_{it} - R_{ft} = \alpha_0 + \alpha_1 Rmrf_t + \alpha_2 Size_{it} + \alpha_3 MOM_{it} + \alpha_4 lnILLIQ_{it-1} + \alpha_5 lnILLIQ_{it}^{U} + (\alpha_5 + \alpha_6 Size_{it}) lnILLIQ_{it}^{U} + \mu_{it} \quad 3.22$$

In order to explore the effect of crisis period on excess stock return this study introduce the dummy of crisis at time t and time t+1 in model 3.23. Where, D_t denotes the effect of crisis at time t and D_{t+1} denotes the effect of crisis at time t+1.

$$R_{it} - R_{ft} = \alpha_0 + \alpha_1 Rmrf_t + \alpha_2 Size_{it} + \alpha_3 MOM_{it} + \alpha_4 lnILLIQ_{it-1} + \alpha_5 lnILLIQ_{it}^{U} + \alpha_7 D_t + \alpha_8 D_{t+1} + \mu_{it} \quad 3.23$$

Further, introducing the moderating role of dummy of crisis at time t and time t+1 with liquidity to check the relationship between liquidity risk and excess stock return in the presence of crisis period.

$$R_{it} - R_{ft} = \alpha_0 + \alpha_1 Rmrf_t + \alpha_2 Size_{it} + \alpha_3 MOM_{it} + \alpha_4 lnILLIQ_{it-1} + \alpha_5 lnILLIQ_{it}^{U} + \alpha_7 D_t + \alpha_8 D_{t+1} + \alpha_9(\alpha_5 + \alpha_7 D_t) lnILLIQ_{it}^{U} + \alpha_{10}(\alpha_5 + \alpha_8 D_{t+1}) lnILLIQ_{it}^{U} + \mu_{it} \quad 3.24$$

Finally estimate the final model of the study in which all variables are collectively estimated

$$R_{it} - R_{ft} = \alpha_0 + \alpha_1 Rmrf_t + \alpha_2 Size_{it} + \alpha_3 MOM_{it} + \alpha_4 lnILLIQ_{it-1} + \alpha_5 lnILLIQ_{it}^{U} +$$

$$(\alpha_5 + \alpha_6 Size_{it}) lnILLIQ_{it}^{U} + \alpha_7 D_t + \alpha_8 D_{t+1} + \alpha_9 (\alpha_5 + \alpha_7 D_t) lnILLIQ_{it}^{U} +$$

$$+\alpha_{10} (\alpha_5 + \alpha_8 D_{t+1}) lnILLIQ_{it}^{U} + \mu_{it} \qquad 3.25$$

Chapter 4

Results and Discussion

This part of the study point out the empirical findings of illiquidity and excess sock return for sample period of 15 year from the year 2004 to 2018. This section firstly explains the descriptive statistics, secondly discuss in detail the correlation analysis and thirdly explain the association among liquidity risk and excess stock return by using common effect technique.

4.1 Summary Statistics

This section reports the value descriptive statistics including min, max, standard deviation (S.D), mean, median, skewness and kurtosis.

Table 4.1 Summary Statistics for the period of 2004-2018

	ER	Mom	Size (In Mill)	Rmrf	Volume	Ami*10^6	Turnover Rate	Ami 2	Roll	%of Zero
Mean	0.138	0.087	14791.582	0.115	575820.265	0.754	0.003	728.864	0.008	0.283
Median	0.002	0.085	1738.559	0.160	14464.830	0.029	0.001	42.134	0.000	0.189
S.D	0.674	0.514	42711.165	0.248	2734699.240	5.485	0.013	13963.097	0.024	0.290
Min	-0.925	-2.030	6.000	-0.497	90.670	0.000	0.000	0.070	0.000	0.000
Max	5.657	3.296	569751.174	0.516	64239434.524	151.049	0.402	593197.028	0.342	1.000
Kurt	13.502	2.056	0.000058	0.349	224.402	382855579.528	550.476	1775.086	61.706	-0.700
Skew	2.735	0.059	0.000007	-0.772	12.655	17434005.186	19.660	41.833	6.728	0.759
Obs.	1830	1830	1830	1830	1830	1830	1830	1830	1830	1830

Note: Descriptive statistics is calculated for each variable from 2004 to 2018.*
*** ER is the Excess stock return. Mom is the momentum of each stock. Size is the total capitalization of a firm. $Rmrf$ is the market risk factor. Volume is the average of daily turnover of each stock. Ami is the amihud ratio of each stock. Turnover rate is the average of turnover rate. Ami 2 is the modified form of amihud. Roll is the roll estimator. % of zero is frequency of zero volume days.*

The value of mean and median show the central tendency of observations. The amount of variation in data is measured by standard deviation and it's provide dispersion and spread of data from mean value. The maximum value indicate the highest value and minimum indicate the lower value of data. Skewness reflect the positive or negative spread of the data and if skewness is zero then data is symmetrical or normally distributed. Kurtosis indicate that data distribution is pointedness or comparatively smoothness. The normal distribution of data is

approximately 3, if kurtosis is 3 it mean data is normally distributed and then normally distributed returns is called mesokurtic and its value is > 3 it is called pointed or lepokurtic while if it is < 3 it is called peaked or platykurtic.

ER is calculated as $(R_{it} - R_{ft})$, where R_{it} is the return of stock I at time t and R_{ft} is the risk free rate. Momentum is the average return of stock I at time t. Size is the market capitalization of each stock at the end of each year. Rmrf is calculated as $(R_{mt} - R_{ft})$, where R_{mt} is the market return at time t and R_{ft} is the risk free rate. Volume is the average of daily turnover of each stock traded at time t. Amihud (2002) is the average of absolute return to average dollar volume. Turnover rate is the average number of stock traded divide by share outstanding. Amihud 2 is the modified form of amihud and it is the average of absolute return divide by turnover rate. Roll estimator is calculated as $\sqrt{-\mathbf{cov}(\Delta \mathbf{P_t}, \Delta \mathbf{P_{t-1}})}$. Percentage of zero volume days is the frequency of number of trading days at time t.

The Table 4.1 report the overview of statistical trend of all variables for the period of 2004 to 2018. The average excess stock return (ER) is the 0.138 with a standard deviation of 0.674. The maximum value of ER is 5.657 and the minimum of ER is -0.925 or -93% . The average momentum is 0.087 and the highest momentum is 3.296 and the lowest momentum is -2.030 with a standard deviation of 42711.165. The average size is Rs. 14791.582 million and the standard deviation is 42711.165. The Pakistan Tobacco Co. ltd. has been reported highest market capitalization i.e Rs. 569751 million in 2018 and the Sardar Chemical Industries Limited has been reported lowest market capitalization i.e Rs. 6 million in 2012. The average of market risk factor is 0.115, the maximum is 0.516 and the minimum value is -0.497 with a standard deviation of 0.248.

The table 4.1 show that average daily trading volume is 575820.265 approximately and the standard deviation is 2734699.240. The highest average daily volume reported by Pakistan Telecommunication limited is 64239435 in 2005 and lowest average daily volume reported by

Pakistan service limited is 91 in 2011. The average value of Amihud (2002) is 0.754 and minimum value of Amihud (2002) is 151.049 and the minimum values is 0.000 with a standard deviation of 5.485. The average turnover rate is 0.003 or 0.03% with a standard deviation of 0.013. The maximum turnover rate is 0.402 or 4.02% and the minimum turnover rate is 0.000. The modified form of Amihud (2002) average value is 728.864 with a standard deviation of 13963.097. The highest value is 593197.028 while smallest values is 0.070.

The average roll estimator is 0.008 or 0.08% and the highest roll estimator 0.342 and the lowest roll estimator is 0.000 with a standard deviation of 0.024. The average value percentage of zero volume days is 0.283 or 28.3% with a standard deviation of 0.290 or 29%. The maximum value of percentage of zero volume days is 1 and the minimum value is 0. The values of table 4.1 report the leptokurtic trend which is > 3 with the maximum value of 382855579.528 and minimum value of -0.700.

4.2 Pearson Correlation Analysis

It explains the association between dependent and independent variables. It is performed to tell about the type of variation between two variable that whether the variables vary together simultaneously or not. Primarily it doesn't tell relationship between two or more than two variables because it is totally different from the regression analysis.

In this analysis, Pearson correlation analysis present the robustness and nature of the relationship through Pearson correlation range i-e from -0.1 to 0.1. Therefore, through magnitude value it can be conclude that the strong point of the association between two variables and the magnitude value can generalize by the distance of correlation from zero. If the correlation is detached from zero or +1 that means the relation between the both variables is strong and solid. If zero is the value its means that there exists no association among the variables. If the correlation value is less than zero or -1 it's indicate that a perfect negative correlation among variables. The sign of positive and negative vale states the nature of the

association between both variables and positive sign indicate that there is a direct relationship between variables while the negative sign indicates that there would be an indirect relationship. If the correlation value between variable is 0.8 or above, then it means there will be more chances of multicollinearity problem in that variable.

Table 4.2 Pearson correlation analysis of excess stock return and illiquidity variable

	ER	Mom	SIZE	Rmrf	Volume	Ami	Turn. Rate	Ami 2	Roll	% of Zero
ER	1									
Mom	0.883	1								
Size	0.056	0.073	1							
Rmrf	0.367	0.464	-0.019	1						
Volume	0.027	0.034	0.323	0.096	1					
Ami	-0.057	-0.087	-0.045	-0.084	-0.028	1				
Turnover	0.054	0.058	0.008	0.131	0.490	-0.029	1			
Ami 2	-0.003	-0.002	0.283	-0.031	0.050	0.018	-0.012	1		
Roll	-0.008	-0.066	-0.092	-0.004	-0.042	0.541	-0.003	-0.003	1	
% of Zero	-0.081	-0.136	0.050	-0.137	-0.191	0.199	-0.151	0.043	0.253	1

Note The Pearson correlation coefficients report the averaged value from 2004 to 2018. All variables of table 4.2 are discussed earlier in table 4.1.*

In table 4.2 report the Pearson correlation between illiquidity risk and excess stock return, the values show the nature and magnitude of relationship between all variables. The Pearson correlation between dependent variable and all other variables indicate that dependent variable is directly correlated with market risk factor, momentum, size, volume, turnover rate. Whereas, negatively correlated with amihud, amihud 2, roll estimator, percentage of zero volume days.

4.3 Regression of illiquidity variables on excess stock return

Main purpose of this study is to observe the impact of illiquidity on excess stock return by applying the ordinary least square (OLS) technique in panel data analysis. The dependent variable is the excess stock return while illiquidity is the explanatory variable which is measured as volume, amihud ratio, turnover ratio, amihud 2 ratio, roll estimator, percentage of zero volume days. The study divides illiquidity further into two parts 1) expected illiquidity 2) unexpected illiquidity. Other independent variables are market risk factor, size, momentum and dummy of crisis for 2008 and 2009. This study has also analyzed the moderating role of size

and dummy with illiquidity. In estimating the multivariate regression equation, total 122 firms are used for a period of 2004 to 2018 in a regression equation.

Mostly variables have legitimate zero values or less than zero. Therefore, to resolve this problem a constant is added with all those variables. Kelly, (2014) argue that when a constant is added it change the interpretation a little bit but it can't change the sign of coefficient. That's why added a constant in all those variables which are zero or less than zero before taking natural log. The table 4.4 present the time series coefficient, adjusted R-Square (model fit statistic), standard error and variable significance statistic (P-value).

To select the best appropriate technique in panel data analysis this study has applied the Redundant Fixed Effects-Likelihood Ratio. In order to find out that between common effect technique and fixed effect technique which technique is most appropriate or suitable for this study? The results of common effect model are reported in appendix A. The empirical analysis of likelihood ratio test indicate that Chi-square value is insignificant in all cases which represents that fixed effect technique is not suitable for this study and this model should use common effect model for further panel data analysis.

The empirical findings of common effect method for excess stock return and illiquidity are presented in table 4.3. All findings of model 1 to model 9 are reported in table 4.3 to 4.8 see in appendix B that have the following econometrics model:

Model 1

$$E(R_{it} - R_{ft}) \mid Rmrf_t) = \alpha_0 + \alpha_1 Rmrf_t + \varepsilon_{it}$$

Model 2

$$E(R_{it} - R_{ft}) \mid Rmrf_t) = \alpha_0 + \alpha_1 Rmrf_t + \alpha_2 Size_{it} + \alpha_3 MOM_{it} + \varepsilon_{it}$$

Model 3

$$E(R_{it} - R_{ft}) \mid lnILLIQ_{it}^{E}) = \alpha_0 + \alpha_1 Rmrf_t + \alpha_2 Size_{it} + \alpha_3 MOM_{it} + \alpha_4 lnILLIQ_{it}^{E}$$

Model 4

$$E(R_{it} - R_{ft}) \mid lnILLIQ_{it}^{E}) = \alpha_0 + \alpha_1 Rmrf_t + \alpha_2 Size_{it} + \alpha_3 MOM_{it} + \gamma_5 lnILLIQ_{it}^{U}$$

Model 5

$$R_{it} - R_{ft} = \gamma_0 + \gamma_1 Rmrf_t + \gamma_2 Size_{it} + \gamma_3 MOM_{it} + \gamma_4 lnILLIQ_{it-1} + \gamma_5 lnILLIQ_{it}^{U} + \mu_{it}$$

Model 6

$$R_{it} - R_{ft} = \gamma_0 + \gamma_1 Rmrf_t + \gamma_2 Size_{it} + \gamma_3 MOM_{it} + \gamma_4 lnILLIQ_{it-1} + \gamma_5 lnILLIQ_{it}^{U} + (\gamma_5 + \gamma_6 Size_{it}) lnILLIQ_{it}^{U} + \mu_{it}$$

Model 7

$$R_{it} - R_{ft} = \gamma_0 + \gamma_1 Rmrf_t + \gamma_2 Size_{it} + \gamma_3 MOM_{it} + \gamma_4 lnILLIQ_{it-1} + \gamma_5 lnILLIQ_{it}^{U} + \gamma_7 D_t + \gamma_8 D_{t+1} + \mu_{it}$$

Model 8

$$R_{it} - R_{ft} = \gamma_0 + \gamma_1 Rmrf_t + \gamma_2 Size_{it} + \gamma_3 MOM_{it} + \gamma_4 lnILLIQ_{it-1} + \gamma_5 lnILLIQ_{it}^{U} + \gamma_7 D_t + \gamma_8 D_{t+1} + \gamma_9(\gamma_5 + \gamma_7 D_t) lnILLIQ_{it}^{U} + \gamma_{10}(\gamma_5 + \gamma_8 D_{t+1}) lnILLIQ_{it}^{U} + \mu_{it}$$

Model 9

$$R_{it} - R_{ft} = \gamma_0 + \gamma_1 Rmrf_t + \gamma_2 Size_{it} + \gamma_3 MOM_{it} + \gamma_4 lnILLIQ_{it-1} + \gamma_5 lnILLIQ_{it}^{U} + (\gamma_5 + \gamma_6 Size_{it}) lnILLIQ_{it}^{U} + \gamma_7 D_t + \gamma_8 D_{t+1} + \gamma_9(\gamma_5 + \gamma_7 D_t) lnILLIQ_{it}^{U} + \gamma_{10}(\gamma_5 + \gamma_8 D_{t+1}) lnILLIQ_{it}^{U} + \mu_{it}$$

To explore the effect of illiquidity on excess stock return common effect model has used. The results reported in appendix B (4.1 b) the value of adjusted R-square are between "0.19 t0 0.90" approximately which reveal that illiquidity have 19% to 90% explanatory power. In fact, it is reported that all model is based on illiquidity variables that can explain a major portion of excess stock return. On the basis of goodness of fit it is concluded that model is correctly specified. On the bases of data set reported in appendix B the most appropriate model is the model 7. So the final econometrics model of the study is model 7. The results report in model 7 (volume) are significant in contrast to all other models and the value of adjusted R-square is 90% approximately in model 7. In model 7 the moderation of size, crisis period at time t and at time t+1 are the omitted variables because of insignificance. So, the model 7 based on illiquidity variables can explain significantly excess stock return

The results of model 7 (volume) indicate that all variables are statistically significant. Market risk factor has statistically significant and positive relationship with excess stock return. The beta coefficient of market risk factor has the value of 0.078. That indicate 1% increase in in market risk factor can increase excess stock return by 0.078%. The coefficient of size indicate that it is statistically significant and it has a negative relationship with excess stock return which shows that firm size anomaly exists. The beta coefficient of size has the value of

-0.002 which indicate that 1% increase in size can decrease excess stock return by 0.002 percent. The coefficient of momentum report that it is statistically significant and has a positive relationship with excess stock return. The results indicate that its effect is not pronounced in PSX. The beta coefficient of momentum has the value of 1.936. That indicate 1% increase in in market risk factor can increase excess stock return by 1.936%.

Table 4.3 Impact of illiquidity risk on excess stock return for the period of 2004 to 2018

	Vol	Ami	Ami 2	Turnover	Roll	zero returns
C	-1.988***	-2.068***	-2.050***	-2.043***	-2.076***	-2.051***
	(0.039)	(0.044)	(0.041)	(0.038)	(0.041)	(0.040)
Rmrf	0.078**	0.099***	0.087***	0.092***	-0.095***	-0.091***
	(0.033)	(0.033)	(0.034)	(0.033)	(0.033)	(0.033)
Size	-0.002*	-0.002**	-0.002	-0.002**	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Mom	1.936***	1.952***	1.941***	1.951***	1.950***	1.945***
	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)
$\boldsymbol{ILLIQ_{it}^{E}}$	-0.003**	23163.970	0.005	0.316	0.414	0.009
	(0.002)	(23822.430)	(0.003)	(0.646)	(0.175)	(0.011)
$\boldsymbol{ILLIQ_{it}^{U}}$	0.010***	-390.049	-0.007***	1.030**	-0.207***	0.043***
	(0.002)	(392.760)	(0.002)	(0.498)	(0.130)	(0.014)
$\boldsymbol{D_t}$	-0.098***	-0.098***	-0.100***	-0.097***	-0.099***	-0.106***
	(0.012)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
$\boldsymbol{D_{t+1}}$	0.103***	0.110***	0.110***	0.107***	0.110***	0.117***
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Adjusted R^2	0.895	0.893	0.894	0.893	0.894	0.894
F-statistics	2083.273	2042.695	2059.893	2046.148	2052.181	2052.680
P value of F stat.	0.000	0.000	0.000	0.000	0.000	0.000

Note $Rmrf$ is the market risk factor. Size is the market capitalization of stock I at time t. Mom is the momentum of stock I at time t. $ILLIQ_{it}^{E}$ is the expected illiquidity of stock I at time t and $ILLIQ_{it}^{U}$ is the unexpected illiquidity. D_t is the moderation of size with liquidity. D_{t+1} is the dummy of crisis (2008) period of stock I at time t and α_8 is the dummy of crisis(2009) of tock I at time t+1. D_t*$ILLIQ_{it}^{U}$ and D_{t+1}*$ILLIQ_{it}^{U}$ are the moderation of dummy of crisis with liquidity. Vol indicate the daily average volume, Ami indicate the Amihud (2002), Ami 2 is the modified form of Amihud (2002), Turnover is the turnover rate, roll indicate the roll estimator and zero returns is the percentage of zero volume days. Standard error are noted in parentheses.* *P<0.1, **P<0.05, ***P<0.01

The coefficient of expected illiquidity report that it is statistically significant and has a inverse relationship with excess stock return. The beta coefficient of expected illiquidity is -0.003, which reveal that 1% increase in expected illiquidity decrease the excess stock return by 0.003%. Unexpected illiquidity is statistically significant and has a direct relationship with excess stock return. The beta coefficient of unexpected illiquidity has the value of 0.010 which

reveal that 1% increase in unexpected illiquidity increase the excess stock return by 0.010%. Dummy of crisis at time t is statistically significant and has a negative relationship with excess stock return which indicates during crisis stocks are not synchronize with the market. The beta coefficient of dummy of crisis at time t is -0.098, which means that 1% increase in dummy of crisis at time t can decrease excess stock return by 0.098%. The coefficient of dummy of crisis at time t+1 report that it is statistically significant and has a direct relationship with excess stock return. The dummy of crisis indicates that market are more synchronize during the crisis period. The beta coefficient of dummy of crisis at time t+1 is 0.103, which means that 1% increase in dummy of crisis at time t+1 can increase excess stock return by 0.103%.

The findings reported in appendix B (4.3 b) the value of adjusted R-square are between "0.19 to 0.89" approximately which reveal that illiquidity have 19% to 89% explanatory power. In fact it is reported that all model are based on illiquidity variables that can explain a major portion of excess stock return. On the basis of goodness of fit it is concluded that model is correctly specified. As it is mentioned earlier that this study discussed the result of model 7. The results of model 7 (Amihud, (2002)) indicate that expected and unexpected illiquidity is not statistically different from zero. Whereas, the market risk factor, size, momentum, dummy of financial crisis period at t and at t+1are statistically significant.

The findings indicate that the market risk factor has statistically and direct relationship with excess stock return. The beta coefficient of market risk factor has the value of 0.099. That indicate 1% increase in in market risk factor can increase excess stock return by 0.099%. The coefficient of size indicate that it is statistically significant and it has a negative relationship with excess stock return which shows that firm size anomaly exists. The beta coefficient of size has the value of -0.002 which indicate that 1% increase in size can decrease excess stock return by 0.002 percent. The coefficient of momentum indicate that it is statistically significant and has a positive relationship with excess stock return.

The beta coefficient of momentum has the value of 1.952. That indicate 1% increase in in market risk factor can increase excess stock return by 1.952%. Dummy of crisis at time t is statistically significant and has an inverse relationship with excess stock return which reveal that during crisis period stocks are not synchronize with the market. The beta coefficient of dummy of crisis at time t is -0.098, which means that 1% increase in dummy of crisis at time t can decrease excess stock return by 0.098%. Dummy of crisis at time t+1 is statistically significant and a direct relationship with excess stock return. The dummy of crisis indicates that market are more synchronize during the crisis period. The beta coefficient of dummy of crisis at time t+1 is 0.110, which means that 1% increase in dummy of crisis at time t+1 can increase excess stock return by 0.103%.

The results reported in appendix B (4.4 b) the value of adjusted R-square are between "0.19 to 89" approximately which reveal that illiquidity have 19% to 89% explanatory power. The findings of adjusted R-squares from model 1 to 9 are aligned with the values of adjusted R-squares from model 1 to 9 of table 4.3. In fact, it is reported that all model are based on illiquidity variables that can explain a major portion of excess stock return. On the basis of goodness of fit it is concluded that model is correctly specified. As it is mentioned earlier that this study discussed the result of model 7. Similarly, in this table the results of model 7 are discussed. The results of model 7 (Modified form of Amihud (2002)) indicate that expected illiquidity is not statistically different from zero and results. Whereas, the market risk factor, size, momentum, unexpected illiquidity, dummy of financial crisis period at t and at t+1 are statistically significant.

The coefficient of market risk factor is statistically significant and has a direct relationship with excess stock return. The beta coefficient of market risk factor has the value of 0.083. That indicate 1% increase in market risk factor can increase excess stock return by 0.083%. The coefficient of size indicate that it is statistically significant and it has a negative

relationship with excess stock return which shows that firm size anomaly exists. The findings of size are aligned with the results of table 4.5 see in appendix B and beta coefficient of size is -0.002 which indicate that 1% increase in size can decrease excess stock return by 0.002 percent. The coefficient of momentum indicate that it is statistically significant and has a direct relationship with excess stock return. The results indicate that its effect is not pronounced in PSX. The beta coefficient of momentum has the value of 1.941. That indicate 1% increase in in market risk factor can increase excess stock return by 1.941%.

Unexpected illiquidity is statistically significant and has an inverse relationship with excess stock return. The beta coefficient of unexpected illiquidity is -0.007 which reveal that 1% increase in unexpected illiquidity decrease the excess stock return by -0.007%. Dummy of crisis at time t is statistically significant and has an inverse relationship with excess stock return which reveal during crisis stocks are not synchronize with the market. The beta coefficient of dummy of crisis at time t is -0.100, which means that 1% increase in dummy of crisis at time t can decrease excess stock return by 0.100%. Dummy of crisis at time t+1 is statistically significant and has a direct relationship with excess stock return. The dummy of crisis indicates that market are more synchronize during the crisis period. The beta coefficient of dummy of crisis at time t+1 is 0.110, which means that 1% increase in dummy of crisis at time t+1 can increase excess stock return by 0.110%.

The results reported in appendix B (4.4 b) the value of adjusted R-square are between "0.19 to 89" approximately which reveal that illiquidity have 19% to 89% explanatory power. The adjusted R-squares of model 1 to 9 are aligned with the adjusted R-squares of model 1 to 9 of table 4.3 and 4.2 see in appendix B. In fact, it is reported that all model is based on illiquidity variables that can explain a major portion of excess stock return. On the basis of goodness of fit it is concluded that model is correctly specified. As it is mentioned earlier that this study discussed the result of model 7. The results of model 7 (turnover) indicate that

expected illiquidity is not statistically different from zero. Whereas, the market risk factor, size, momentum, unexpected illiquidity, dummy of financial crisis period at t at t+1 are statistically significant.

The market risk factor is statistically significant and has a direct relationship with excess stock return. The beta coefficient of market risk factor has the value of 0.092. That indicate 1% increase in market risk factor can increase excess stock return by 0.092%. The coefficient of size indicate that it is statistically significant and it has a negative relationship with excess stock return which shows that firm size anomaly exists. The beta coefficient of size has the value of -0.002 which indicate that 1% increase in size can decrease excess stock return by 0.002 percent. The coefficient of momentum indicate that it is statistically significant and has a positive relationship with excess stock return. The results indicate that its effect is not pronounced in PSX. The beta coefficient of momentum has the value of 1.951. That indicate 1% increase in in market risk factor can increase excess stock return by 1.951%.

The findings reveal that unexpected illiquidity is statistically significant and has a negative relationship with excess stock return. The beta coefficient of unexpected illiquidity has the value of 1.030 which reveal that 1% increase in unexpected illiquidity increase the excess stock return by 1.030%. The coefficient of dummy of crisis at time t is indicate that it statistically significant and has an inverse relationship with excess stock return which indicates during crisis stocks are not synchronize with the market. The beta coefficient of dummy of crisis at time t is -0.097, which means that 1% increase in dummy of crisis at time t can decrease excess stock return by 0.097%. Dummy of crisis at time t+1 is statistically significant and has a positive relationship with excess stock return. The dummy of crisis indicates that market are more synchronize during the crisis period. The beta coefficient of dummy of crisis at time t+1 is 0.107, which means that 1% increase in dummy of crisis at time t+1 can increase excess stock return by 0.107%.

The results reported in appendix B (4.5 b) the value of adjusted R-square are between "0.19 to 89" approximately which reveal that illiquidity have 19% to 89% explanatory power. The adjusted R-squares of model 1 to 9 are aligned with the adjusted R-squares of model 1 to 9 of table 4.2, 4.3 and 4.4 see in appendix B. In fact, it is reported that all model are based on illiquidity variables that can explain a major portion of excess stock return. On the basis of goodness of fit it is concluded that model is correctly specified. As it is mentioned earlier that this study discussed the result of model 7. The results of model 7 (roll estimator) indicate that expected illiquidity is not statistically different from zero. Whereas, the market risk factor, size, momentum, unexpected illiquidity, dummy of financial crisis period at time t and t+1 are statistically significant.

The coefficient of market risk factor is statistically significant and has a negative relationship with excess stock return. The beta coefficient of market risk factor has the value of -0.095. That indicate 1% increase in market risk factor can decrease excess stock return by 0.095%. The coefficient of size indicate that it is statistically significant and it has a negative relationship with excess stock return which shows that firm size anomaly exists. The beta coefficient of size has the value of -0.001, which means 1% increase in size decrease the excess stock return by 0.001 percent. The coefficient of momentum indicate that it is statistically significant and has a positive relationship with excess stock return. The results indicate that its effect is not pronounced in PSX. The beta coefficient of momentum has the value of 1.950. That indicate 1% increase in in market risk factor can increase excess stock return by 1.950%.

Unexpected illiquidity is statistically significant and has a negative relationship with excess stock return. The beta coefficient of unexpected illiquidity is -0.207, which mean that 1% increase in unexpected illiquidity can decrease the excess stock return by 0.207%. Dummy of crisis at time t is statistically significant and has an inverse relationship with excess stock return which indicates during crisis stocks are not synchronize with the market. The beta

coefficient of dummy of crisis at time t is -0.099, which means that 1% increase in dummy of crisis at time t can decrease excess stock return by 0.099%. Dummy of crisis at time t+1 is statistically significant and has a direct relationship with excess stock return. The dummy of crisis indicates that market are more synchronize during the crisis period. The beta coefficient of dummy of crisis at time t+1 is 0.110, which means that 1% increase in dummy of crisis at time t+1 can increase excess stock return by 0.110%.

The findings reported in appendix B (4.6 b) the value of adjusted R-square are between "0.19 to 89" approximately which reveal that illiquidity have 19% to 89% explanatory power. The adjusted R-squares of model 1 to 9 are consistent with the adjusted R-squares of model 1 to 9 of table 4.2, 4.3, 4.4 and 4.5 see in appendix B. In fact, it is reported that all model are based on illiquidity variables that can explain a major portion of excess stock return. On the basis of goodness of fit it is concluded that model is correctly specified. The results of model 7 (Percentage of zero volume days) indicate that size and expected illiquidity is not statistically different from zero. Whereas, the market risk factor, momentum, unexpected illiquidity, dummy of financial crisis period at t and t+1 are statistically significant.

The coefficient of market risk factor is statistically significant and has an inverse relationship with excess stock return. The beta coefficient of market risk factor has the value of -0.091. That indicate 1% increase in market risk factor can decrease excess stock return by 0.091. The coefficient of momentum indicate that it is statistically significant and has a positive relationship with excess stock return. The results indicate that its effect is not pronounced in PSX. The beta coefficient of momentum has the value of 1.945. That indicate 1% increase in in market risk factor can increase excess stock return by 1.945%.

Unexpected illiquidity is statistically significant and has a positive relationship with excess stock return. The beta coefficient of unexpected illiquidity is 0.043 which reveal that 1% increase in unexpected illiquidity increase the excess stock return by 0.043%. Dummy of

crisis at time t is statistically significant and has an inverse relationship with excess stock return which indicates during crisis stocks are not synchronize with the market. The beta coefficient of dummy of crisis at time t is -0.106, which means that 1% increase in dummy of crisis at time t can decrease excess stock return by 0.106%. Dummy of crisis at time t+1 is statistically significant and has a direct relationship with excess stock return. The dummy of crisis indicates that market are more synchronize during the crisis period. The beta coefficient of dummy of crisis at time t+1 is 0.117, which means that 1% increase in dummy of crisis at time t+1 can increase excess stock return by 0.117%.

4.4 Discussion

The overall result of size and momentum are contradictory with the study of (Saeed & Hassan, 2018). These results reveal that firm size anomaly exists in Pakistan stock market and indicate that momentum effect is not pronounced in Pakistan stock market. The result suggest that unexpected illiquidity has a significant effect on excess stock return and the empirical findings are consistent with ((Amihud, 2002); (Li et all, 2019)). The findings of this study also indicate that excess stock return are effected during crisis time period and the effect will remain after crisis period and results are consistent with ((Amihud & Wood, 1990); (Shiller, Konya, & Tsutsui, 1991)). Finally, on the basis of overall results the hypothesis 2, 7 and 8 is accepted while hypothesis 1, 3, 4, 5 and 6 is rejected.

Chapter 5

Conclusion

This study use panel data in order to provide evidence about the "FTL" phenomena in context of Pakistan equity market from 2004 to 2018. The previous study of Pastor and Stambaugh (2003) document that FTL phenomena has an inverse relationship because investor prefer to buy liquid stock as compare to illiquid stock during the time of economic distress. This study considers various measure of stock illiquidity (Amihud (2000), volume, modified form of Amihud (2000), turnover rate, roll estimator and percentage of zero volume days and) to study the association among stock illiquidity and expected return.

The empirical findings of the study reveals that the expected illiquidity has insignificant effect on excess stock return, while the unexpected illiquidity has a significant effect excess stock return which reveal that there is an issue of "FTL" prevail in Pakistan equity market. Amihud (2002) illustrate that during unexpected illiquidity the prices of stock are lower and this behavior is triggered in Pakistani equity market in last period of time when there is a decline seen in the market. The uncertainty in the stock market discourage the investor to invest in the stock market. In this situation investor prefer to invest in gold or in real estate market instead of investing in stock market and lead toward downfall in the market. Empirical analysis of this study suggest that the stock market crash of August, 2008 can be interpreted in light of the FTL and findings are consistent with the study of (Shiller, Konya, & Tsutsui, 1991).The empirical analysis also indicate that in context of Pakistan equity market the crisis period significantly affect the excess stock return and the impact also remain significant after crisis period.

5.1 Recommendation:

This study suggests that the market participant in Pakistan equity market including policy-makers, regulators and investor should not ignore the "FTL" phenomena. In light of these findings investors must reallocate their portfolio on the basis of information available in

market and make informed trade decision in order to avoid this situation. The study also suggests that improvements in trading mechanisms and proper use of information technology have a greater potential than regulation. The significant association among excess stock return and unexpected liquidity risk recommends policymakers to device policies that will improves liquidity risk and also promote growth.

Moreover, government must have revised their interest rate policy due to it investor's sentiment change. Because of a higher interest rate, investors have taken money out from the risk-based equity (share) market and invested it in debt instruments like bonds. This condition create panic in the stock market as it is seen in Pakistan stock exchange over the last period of time. The positive and negative news regarding political environment of the country also effect the stock market. Beside this the low economic growth, fluctuating global stability and geographical conditions are the other factors that have hurt investors' sentiment.

Recently the news regarding coronavirus is an unanticipated event coincided with the recent plunge in the market. Concerns about the spread of disease and financial slowdown are driving deep dips in the stock market. Under these circumstances government have to provide opportunities and soundness environment to the investor so that investor invests in the stock market and market escape from downfall. All of these factors effects the investor's sentiment and lead towards market downturn. By considering all of these factors investor should reallocate their portfolio and make sound decisions regarding investment.

5.2 Future Implication

This study pay attention on the Pakistani equity market and on 2008 financial crisis. This study would be useful to examine the "FTL" phenomena for South Asian markets in the light of global financial crisis.

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Appendix A

Likelihood Test Ratio (volume)

Effects Test	Statistic	d.f.	Prob.
Cross-section F	1.163322	(1,211,581)	0.1158
Cross-section Chi-square	145.6763	121	0.0628

Likelihood Test Ratio (Amihud)

Effects Test	Statistic	d.f.	Prob.
Cross-section F	1.183	-1211581	0.092
Cross-section Chi-square	148.027	121	0.048

Likelihood Test Ratio (Modified form of Amihud)

Effects Test	Statistic	d.f.	Prob.
Cross-section F	1.175	-1211582	0.101
Cross-section Chi-square	147.014	121	0.054

Likelihood Test Ratio (Turnover)

Effects Test	Statistic	d.f.	Prob.
Cross-section F	1.175	-1211582	0.101
Cross-section Chi-square	147.041	121	0.054

Likelihood Test Ratio (Roll Estimator)

Effects Test	Statistic	d.f.	Prob.
Cross-section F	1.148	-1211582	0.138
Cross-section Chi-square	143.727	121	0.078

Likelihood Test Ratio (Percentage of Zero Volume Days)

Effects Test	Statistic	d.f.	Prob.
Cross-section F	1.180	-1211582	0.010
Cross-section Chi-square	147.633	121	0.050

Appendix B

Table 4.1 b

	Model 9	Model 8	Model 7	Model 6	Model 5	Model 4	Model 3	Model 2	Model 1
C	-1.993***	-1.989***	-1.988***	-1.830 ***	-1.828***	-1.841***	-1.863***	-1.882***	0.021
	(0.039)	(0.039)	(0.039)	(0.031)	(0.031)	(0.029)	(0.031)	(0.030)	(0.033)
Rmrf	0.081***	0.077**	0.078**	-0.086***	-0.086***	-0.088***	-0.077***	-0.035*	0.9451***
	(0.033)	(0.033)	(0.033)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.044)
Size	-0.002*	-0.002*	-0.002*	-0.003***	-0.003***	-0.003***	-0.003***	-0.003***	
	(0.003)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	
Mom	1.937***	1.937***	1.936***	1.922***	1.922***	1.924***	1.936***	1.930***	
	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.020)	
$ILLIQ_{it}^{E}$	-0.003*	-0.003*	-0.003**	-0.002	-0.002		-0.002		
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)		(0.002)		
$ILLIQ_{it}^{U}$	0.040**	0.011***	0.010***	0.035	0.011***	0.011***			
	(0.019)	(0.002)	(0.002)	(0.019)	(0.002)	(0.002)			
Size*	-0.001			-0.001					
$ILLIQ_{it}^{U}$	(0.001)			(0.001)					
D_t	-0.100***	-0.099***	-0.098***						
	(0.013)	(-0.013)	(0.012)						
D_{t+1}	0.107***	0.107***	0.103***						
	(0.015)	(0.015)	(0.014)						
D_t*	-0.012	-0.014							
$ILLIQ_{it}^{U}$	(0.012)	(-0.012)							
D_{t+1}*	0.006	0.007							
$ILLIQ_{it}^{U}$	(0.010)	(0.784)							
Adj R^2	0.898	0.895	0.895	0.892	0.891	0.891	0.889	0.875	0.199
F-stat.	1459.391	1619.756	2083.273	2331.972	2797.146	3495.264	3425.234	4275.148	454.880
P value of F stat.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 4.2 b

	Model 9	Model 8	Model 7	Model 6	Model 5	Model 4	Model 3	Model 2	Model 1
C	-2.057***	-2.060***	-2.068***	-1.876 ***	-1.876***	-1.872***	-1.879***	-1.882***	0.021
	(0.044)	(0.044)	(0.044)	(0.036)	(0.036)	(0.029)	(0.035)	(0.030)	(0.033)
Rmrf	0.098***	0.098***	0.099***	-0.079***	-0.079***	-0.079***	-0.078***	-0.035*	0.9451***
	(0.033)	(0.033)	(0.033)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.044)
Size	-0.003***	-0.002**	-0.002**	-0.003***	-0.003***	-0.003***	-0.003***	-0.003***	
	(0.003)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	
Mom	1.950***	1.951***	1.952***	1.938***	1.938***	1.938***	1.939***	1.930***	
	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.020)	
$ILLIQ_{it}^{E}$	27468.730	25321.570	23163.970	3675.318	4020.889		3612.62		
	(23871.030)	(23757.390)	(23822.430)	(24217.370)	(24140.489)		(24126.09)		
$ILLIQ_{it}^{U}$	6429.161	-1435.362	-390.049	-1783.692	-237.319	-235.422			
	(8503.020)	(566.970)	(392.760)	(8246.181)	(399.772)	(399.495)			
Size* $ILLIQ_{it}^{U}$	-470.015			-90.733					
	(507.043)			(483.275)					
D_t	-0.103***	-0.103***	-0.098***						
	(0.013)	(-0.013)	(0.013)						
D_{t+1}	0.107***	0.107***	0.110***						
	(0.014)	(0.014)	(0.014)						
D_t* $ILLIQ_{it}^{U}$	-23263.450	-23797.990***							
	(9094.514)	(9075.837)							
D_{t+1}* $ILLIQ_{it}^{U}$	2299.133	2026.428**							
	(827.998)	(773.941)							
Adj R^2	0.894	0.894	0.893	0.889	0.889	0.889	0.889	0.875	0.199
F-stat.	1440.542	1600.639	2042.695	2279.534	2736.985	3423.179	3422.445	4275.148	454.880
P value of F stat.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 4.3 B

	Model 9	Model 8	Model 7	Model 6	Model 5	Model 4	Model 3	Model 2	Model 1
C	-2.045***	-2.046***	-2.050***	-1.862***	-1.863***	-1.854***	-1.884***	-1.882***	0.021
	(0.041)	(0.041)	(0.041)	(0.031)	(0.031)	(0.029)	(0.030)	(0.030)	(0.033)
Rmrf	0.086***	0.083***	0.087***	-0.090***	-0.090***	-0.092***	-0.077***	-0.035*	0.9451***
	(0.020)	(0.034)	(0.034)	(0.021)	(0.020)	(0.020)	(0.020)	(0.020)	(0.044)
Size	-0.002	-0.002	-0.002	-0.003***	-0.003***	-0.003***	-0.003***	-0.003***	
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	
Mom	1.940***	1.941***	1.941***	1.927***	1.927***	1.929***	1.937***	1.930***	
	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.020)	
$ILLIQ_{it}^{E}$	0.004	0.005	0.005	0.002	0.002		0.002		
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)		(0.003)		
$ILLIQ_{it}^{U}$	-0.033	-0.008***	-0.007***	-0.010	-0.007***	-0.007***			
	(0.020)	(0.002)	(0.002)	(0.020)	(0.002)	(0.002)			
Size* $ILLIQ_{it}^{U}$	0.001			0.000					
	(0.001)			(0.001)					
D_t	-0.085***	-0.085***	-0.100***						
	(0.015)	(0.015)	(0.013)						
D_{t+1}	0.095***	0.095***	0.110***						
	(0.017)	(0.017)	(0.014)						
D_t* $ILLIQ_{it}^{U}$	-0.015	-0.013							
	(0.012)	(0.012)							
D_{t+1}* $ILLIQ_{it}^{U}$	0.018	0.016							
	(0.009)	(0.009)							
Adj R^2	0.894	0.894	0.894	0.890	0.890	0.890	0.889	0.875	0.199
F-stat.	1443.890	1603.563	2059.893	2296.950	2757.932	3447.763	3424.197	4275.148	454.880
P value of F stat.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 4.4 b

	Model 9	Model 8	Model 7	Model 6	Model 5	Model 4	Model 3	Model 2	Model 1
C	-2.044***	-2.044***	-2.043***	-1.868***	-1.869***	-1.870***	-1.875***	-1.882***	0.021
	(0.038)	(0.038)	(0.038)	(0.029)	(0.029)	(0.029)	(0.029)	(0.030)	(0.033)
Rmrf	0.095***	0.092***	0.092***	-0.079***	-0.079***	-0.078***	-0.080***	-0.035*	0.9451***
	(0.033)	(0.033)	(0.033)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.044)
Size	-0.002**	-0.002**	-0.002**	-0.003***	-0.003***	-0.003***	-0.003***	-0.003***	
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	
Mom	1.950***	1.951***	1.951***	1.936***	1.936***	1.935***	1.940***	1.930***	
	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.020)	
$ILLIQ_{it}^{E}$	0.410	0.386	0.316	0.558	0.540		0.490		
	(0.622)	(0.659)	(0.646)	(0.659)	(0.658)		(0.658)		
$ILLIQ_{it}^{U}$	6.102	1.140**	1.030**	3.247	1.020**	1.004**			
	(5.396)	(0.523)	(0.498)	(5.728)	(0.507)	(0.506)			
Size*	-0.217			-0.097					
$ILLIQ_{it}^{U}$	(0.235)			(0.248)					
D_t	-0.097***	-0.096***	-0.097***						
	(0.013)	(0.013)	(0.013)						
D_{t+1}	0.108***	0.107***	0.107***						
	(0.015)	(0.015)	(0.014)						
D_t*	-0.574	-1.143							
$ILLIQ_{it}^{U}$	(5.676)	(5.642)							
D_{t+1}*	-0.569	-0.141							
$ILLIQ_{it}^{U}$	(5.378)	(5.358)							
Adj R^2	0.893	0.893	0.893	0.889	0.889	0.889	0.889	0.875	0.199
F-stat.	1431.051	1590.099	2046.148	2286.108	2744.635	3431.282	3423.649	4275.148	454.880
P value of F stat.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 4.5 b

	Model 9	Model 8	Model 7	Model 6	Model 5	Model 4	Model 3	Model 2	Model 1
C	-2.059***	-2.073***	-2.076***	-1.883***	-1.892***	-1.868***	-1.901***	-1.882***	0.021
	(0.041)	(0.041)	(0.041)	(0.032)	(0.032)	(0.029)	(0.031)	(0.030)	(0.033)
Rmrf	-0.084***	-0.094***	-0.095***	-0.083***	-0.081***	-0.081***	-0.080***	-0.035*	0.9451***
	(0.033)	(0.033)	(0.033)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.044)
Size	-0.001	-0.001	-0.001	-0.002*	-0.002	-0.003***	-0.002	-0.003***	
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	
Mom	1.947***	1.949***	1.950***	1.932***	1.935***	1.936***	1.937***	1.930***	
	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.020)	
$ILLIQ_{it}^{E}$	0.172	0.349**	0.414	0.084	0.329		0.355**		
	(0.183)	(0.178)	(0.175)	(0.184)	(0.178)		(0.177)		
$ILLIQ_{it}^{U}$	5.509**	-	-0.207***	6.928	-0.207	-0.229			
	(1.504)	0.0306***	(0.130)	(1.490)	(0.133)	(0.132)			
		(0.152)							
Size*	-0.318			-0.396					
$ILLIQ_{it}^{U}$	(0.082)			(0.082)					
D_t	-0.094***	-0.097***	-0.099***						
	(0.013)	(-0.013)	(0.013)						
D_{t+1}	0.103***	0.107***	0.110***						
	(0.014)	(0.014)	(0.014)						
D_t*	-0.899	-1301							
$ILLIQ_{it}^{U}$	(0.880)	(0.878)							
D_{t+1}*	0.312	0.504							
$ILLIQ_{it}^{U}$	(0.316)	(0.313)							
Adj R^2	0.894	0.894	0.894	0.891	0.889	0.889	0.889	0.875	0.199
F-stat.	1451.796	1598.164	2052.181	2324.102	2747.957	3429.215	3431.455	4275.148	454.880
P value of F stat.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 4.6 b

	Model 9	Model 8	Model 7	Model 6	Model 5	Model 4	Model 3	Model 2	Model 1
C	-2.059***	-2.059***	-2.051***	-1.877***	-1.873***	-1.868***	-1.880***	-1.882***	0.021
	(0.040)	(0.040)	(0.040)	(0.032)	(0.032)	(0.030)	(0.031)	(0.030)	(0.033)
Rmrf	-0.085***	-0.089***	-0.091***	-0.085***	-0.084***	-0.084***	-0.078***	-0.035*	0.9451***
	(0.033)	(0.033)	(0.033)	(0.021)	(0.021)	(0.021)	(0.020)	(0.020)	(0.044)
Size	-0.001	-0.001	-0.001	-0.003***	-0.003***	-0.003***	-0.003***	-0.003***	
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	
Mom	1.949***	1.948***	1.945***	1.937***	1.935***	1.936***	1.938***	1.930***	
	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.020)	
$ILLIQ_{it}^{E}$	0.011	0.011	0.009	0.005	0.004		0.004		
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)		(0.011)		
$ILLIQ_{it}^{U}$	0.188*	0.054***	0.043***	0.319***	0.013	0.013			
	(0.135)	(0.015)	(0.014)	(0.136)	(0.014)	(0.014)			
Size* $ILLIQ_{it}^{U}$	-0.012			-0.006					
	(0.006)			(0.007)					
D_t	-0.058***	-0.057***	-0.106***						
	(0.019)	(0.019)	(0.013)						
D_{t+1}	0.069***	0.068***	0.117***						
	(0.020)	(0.020)	(0.014)						
D_t* $ILLIQ_{it}^{U}$	-0.225	-0.230							
	(0.081)	(0.081)							
D_{t+1}* $ILLIQ_{it}^{U}$	0.191	0.201							
	(0.059)	(0.059)							
Adj R^2	0.894	0.894	0.894	0.889	0.889	0.890	0.889	0.875	0.199
F-stat.	1449.063	1607.563	2052.680	2289.383	2737.984	3424.144	3422.699	4275.148	454.880
P value of F stat.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000