GBMR

Global Business and Management Research: An International Journal
Vol. 14, No. 3s (2022)

The Illiquidity Premium and Commonality in the Illiquidity Premium: Evidence from Indian Actively Managed Equity Funds and Stock Market

Suresh Kumar
Faculty of Management Science, Sukkur IBA University, Sukkur, Sindh, Pakistan
Email: sureshkumar@iba-suk.edu.pk

Eliza Nor*
School of Management, Universiti Sains Malaysia
Email: eliza.nor@usm.my

Nik Hadiyan Nik Azman
School of Management, Universiti Sains Malaysia
Email: nikhadiyan@usm.my

** Corresponding author*

Abstract

Purpose: This study aims to investigate whether the actively managed equity funds of India, are compensated for taking on illiquid assets in underlying equity portfolios.

Design: Multiple regression analysis was performed.

Findings: This study inspects the illiquidity premiums for the Indian equity market and equity funds are calculated by return differences between illiquid and liquid stocks/funds, and risk-adjusted illiquidity premiums by the interception of regression of funds and stock illiquidity premiums on Indian risk factors. Also identified the existence of commonality in illiquidity premium between Indian actively managed equity funds and the security market, after controlling for three risk factors of Fama and French (1993).

Research limitations/implications: The various proxies/measures of liquidity, analyses different dimension of liquidity and can result in different outcomes. Therefore, results of liquidity level premium from different researchers, including this, are very sensitive to liquidity measure, which cannot be generalized. Further, this research may be easily extended to other types of mutual funds, such as fixed income mutual funds and mixed/hybrid mutual funds, to analyze the pricing of liquidity factor.

Practical implications: This study reveals some of the risks and benefits created when fund managers gain exposure to illiquid assets. Findings reveal that different liquidity management rules and regulations are required to support the stability of the mutual fund industry without averting equity funds from investing in a range of lucrative investment opportunities. The study also holds many contributions for the fund investors, who either directly invest in mutual funds or indirectly contribute to mutual funds through pension plans, and insurance policies (e.g., life assurance), are influenced by the liquidity related issues, as these funds or plans may have significant exposure in illiquid assets.

Originality/value: This study follows commonality in illiquidity premium approach of Amihud et al. (2015), which is distinct from renowned commonality in illiquidity.

Keywords: Illiquidity premium, Open-ended funds, Commonality in illiquidity premium.

1. Introduction

After the global financial crises of 2007-2009, there has been an intense rise in worldwide mutual fund assets. Meanwhile, Indian financial markets have witnessed an almost three-fold increase in assets under management (AUM) during the last decade. According to the Association of Mutual funds in India (AMFI, 2020), the Indian mutual fund industry's AUM has increased from INR8.09 trillion rupees on April 30, 2010, to INR 23.93 trillion rupees on April 30, 2020.

In India, mutual funds perform better than their benchmarks. This is against the general view found in other countries whereby funds usually do not outperform their benchmarks. However, in Indian, equity funds perform well, as do their market return portfolios (Agarwal and Pradhan, 2018; Rao, 2020; Agarwal, and Mirza, 2017; Tripathy, 2017). Bhagyasree and Kishori (2016) reported that almost 47% to 63% of Indian equity open-ended funds beat their respective benchmark indices; and that all the sample funds generated better returns than risk free rates of return. According to Agarwal and Pradhan (2018), Indian stock markets are not efficient in term of stock related information secrecy, like in other developing markets and therefore offering fund managers higher returns to grab, than benchmarks. However, if the efficient market hypothesis (EMH) holds, the existence of active fund management will never be justified.

Indeed, illiquidity as characteristic of the securities and markets always helps in validating the efficient market hypothesis[1]. According to finance theory, investors will be compensated based on the riskiness of their investment. In other words, there is a positive relationship between risk and return. In terms of illiquidity of the asset, investors will demand illiquidity premium to compensate for the illiquidity risk embedded in the assets.

Amihud, Hameed, Kang, and Zhang (2015), show the highest mean illiquidity for India among 45 emerging and developed markets. This study tries to offer new outcomes and characteristics of Indian equity funds, from fund illiquidity consideration. Therefore, the present study tries to investigate the existence of illiquidity premium which might contribute to the outperformance of the Indian equity funds. The outperformance of Indian equity funds as discussed above may suggest that untying liquidity constraints lead them to illiquidity premium, which contributes to superior performance. As recent arrangement of liquidity risk management programmes by local and international authorities (i.e. Financial Standard Board-FSB, Board of the International Organization of Securities Commissions - IOSCO), bind fund management to invest in cash and other liquid securities, in order to fulfill redemption obligations. On the contrary since 2008, the regulations of the Securities and Exchange Board of India (Sebi) provide a liquidity window to mutual funds by offering a credit facility up to 20% of total assets value, to meet redemption obligations and dividend pay-out (AMFI, 2020).

[1] For example, Amihud and Mendelson (1991) show that securities having the same offerings (returns) but different market price do not violate the assumption of efficient market hypothesis unless they have different liquidity costs.

Stock liquidity and fund liquidity are interrelated since both the stock liquidity and proportion of stocks held in the fund portfolio determine the fund level liquidity. However, both the stock liquidity and fund liquidity are two distinct variables. Stock liquidity is described as the ability of a stock, on average, to be converted into cash quickly, without affecting much of its market price. As for mutual funds, using a value weighted average liquidity of all stocks held in fund portfolio is a very common approach in measuring fund liquidity. This approach has been employed by numerous researchers such as Dong, Feng and Sadka (2019), Huang (2015), Idzorek et al. (2012), Phalippou and Massa (2005) and Lo, Petrov and Wierzbicki (2006). However, in this previous research, portfolio liquidities had been scaled independently. For example, two OEFs hold 10% of their assets in security Z, and 90% of assets in security Y. As a result, fund level liquidity (the weighted average liquidity of all holdings) of both OEFs might be equal, regardless of fund size (net assets of fund). This issue is important for fund level liquidity because as fund size increases, it erodes fund liquidity by triggering trading (liquidity) cost of fund portfolio (Chen et al., 2002).[2] The liquidity cost of a security and fund size both increases with total volume of that security held in fund portfolio. As bid-ask spread widens with increase in total sellable volume of a security and so does liquidity cost.[3] However, if fund size expands with diversified investments, it may not expand its liquidity costs. According to Fulkerson and Riley (2016), "funds with relatively concentrated portfolios have significantly greater average liquidity costs compared to the full sample average, while funds with relatively diversified portfolios have costs close to zero". Finally, it implies that whether or not **size** affects fund level liquidity, the way the fund is structured matters. Funds with illiquid (liquid) assets and concentrated (diversified) portfolio, may be characterized as illiquid (liquid) funds. This study implies Bloomberg liquidity assessment tool (LQA) for the computation of liquidity cost. LQA provides assessment of liquidity for an asset, including transaction cost in percentage in combination with number of days, which are distributed across different volumes (see Appendix A). Thus, the liquidity cost of a security is not a constant figure at any given point in time, it may decrease or increase with volume of that security, held by an OEF. Liquidity cost of a security may not be similar in two different OEFs unless both are holding similar quantity (volume) of that security (see Appendix B).

The objectives of the study are threefold. First, the study will analyze whether illiquid equity securities generate better returns than liquid equity securities in the Indian stock market. Second, the study will investigate whether illiquid equity fund generates better returns than liquid equity fund in the Indian equity fund market. Finally, the study tries to prove empirically the existence of commonality between the stock market and the equity fund market. In other words, if commonality exists, there is a correlation between both markets.

Consistent with positive illiquidity premium at fund level, we will also investigate illiquidity premium at security level in the Indian stock market. The study conducted a two-fold performance analysis of open-ended mutual funds via: (1) individual performance of each sample fund; and (2) group performance of funds by creating a fund of funds portfolio.

We find that the average monthly illiquidity premium at equity fund level and security market level are 0.27% and 0.55% for the fund of funds portfolio and equity market portfolio respectively, and that both are equally weighted. Although illiquid minus liquid funds portfolio return

[2] A long literature starting with Malkiel (1977), Lee et al. (1991), Nanda, Narayanan & Warther (2000), Datar (2001), Varma (2002), Cherkes et al. (2009), Cullinan, & Zheng (2014) argues for miscalculation of illiquid assets in underlying portfolio of funds.

[3] Nonetheless, funds may cushion their liquidity cost, if fund size expands with diversified investments, instead of concentrated investment Fulkerson and Riley (2016).

(illiquidity premium) is lesser than market illiquidity premium, altogether illiquidity at equity fund level is positively priced in the Indian financial market.

We also show the existence of commonality in illiquidity premium between equity funds and the security market in India. The fund market illiquidity premium co-varies positively and significantly with market illiquidity premium, after controlling for common risk factors.

Finally, the commonality (either in illiquidity or illiquidity premium) is a phenomenon which exists in the Indian stock and equity fund markets, where illiquidity in funds and stocks are both positively priced. Consistent with the findings by Amihud et al. (2015), we find that commonality in illiquidity does not lead to commonality in illiquidity premium. The equity market illiquidity fails to significantly affect commonality relationship between illiquidity premium of fund and equity market. The commonality in illiquidity premium of fund and equity market show minute increment after controlling for equity market illiquidity.

Previous studies on illiquidity premium have mainly focused at the security level (see for instance, Pastor and Stambaugh; 2003, Acharya and Pedersen; 2005, Bekaert, Harvey, and Lundblad; 2007, Rephael , Kadan, and Wohl; 2015, Amihud et al., 2015, Andreasen, Martin, Christensen, and Riddell; 2017). Very few studies have focused on the illiquidity premium at the mutual funds level. Indeed, illiquidity premium at fund level has been studied in major developed countries, even it appears noticeably higher in emerging equity markets (Amihud et al., 2015, Bekaert, Harvey, and Lundlad, 2007). For example, Khandani and Lo (2011) reported positive illiquidity premium in hedge and fixed income funds for US market. Huang (2015) concluded that dynamic liquid funds outperform illiquid funds during volatile times in US. Foran, Sullivan (2014) reported negative illiquidity premium in equity and income funds of UK. Whereas Otten and Reijnders (2012) showed positive illiquidity premium in equity funds of UK. Most of the studies related to mutual funds were performed using the data collected from the US and European developed markets (Premaratne, and Mensah, 2014).

Therefore, this study intends to fill up this gap by investigating whether the actively managed equity funds of India are compensated for taking on illiquid assets in underlying equity portfolios. Hence, this study pays much attention to liquidity effects on mutual funds performance and argues that it is a preference for holding highly illiquid stocks which result in the perceived outperformance. The present study may be among a few mutual fund studies which examine liquidity as a characteristic of funds performance in an emerging market.

To our knowledge, this is the first study to test commonality in illiquidity premiums between two different but interrelated markets of India; the commonality in illiquidity premiums of equity funds and equity market. This study adopts the Amihud, Hameed, Kang, and Zhang (2015) commonality in illiquidity premium approach, which is distinct from other studies regarding commonality in illiquidity. Amihud et al. tested commonality in illiquidity premium at both the global and regional levels -that is commonality of price of illiquidity across different countries. “The commonality in illiquidity return premium is economically distinct from the commonality in illiquidity characteristic” (Amihud et al., 2015, p.351). The commonality that was introduced by Amihud et al (2015) is different in such a way that the commonality exists in the illiquidity return premium across markets but not in the level of illiquidity. The authors conclude that the illiquidity return premiums co-vary positively with the global and regional illiquidity premiums across markets after controlling for global and regional common risk factors.

The study is organized as follows. The section 2 presents literature and develop hypothesis of study. Section 3 describes the data, the illiquidity model, and methodology for estimating the

illiquidity premium of fund and equity portfolios. Section 4 presents the empirical results and discussion. The last section provides some concluding remarks.

2. Literature Review

Mutual Fund Performance

Most of the past studies on mutual fund performance in US (as proxy of developed countries) have concluded that net performance of mutual funds is not better than their respective market performance (see for instance, Malkiel, 1995; Frino and Gallagher, 2001; Benos and Jochec, 2011; Brown, Paladino, Wang, and Yao, 2017; Fama, and French, 2010). However, the consensus of underperformance of equity mutual funds in developed markets also true for many emerging markets. For example, Lemeshko and Rejnus (2015), studied active and passive funds of 27 emerging countries and reported negative performance against their benchmarks. Ferreira, Keswani, Miguel, and Ramos (2011) investigated the actively managed equity funds of 27 emerging and developed countries and reported underperformance relative to their markets. Wagner and Margaritis (2017) studied the funds principally investing in emerging market equities from 14 countries. They reported that emerging markets funds perform better than benchmark before deducting the costs, but net performance was not better than the respective benchmarks.
According to Mateus, Mateus, and Todorovic, (2019), reported benchmark indices of mutual funds do not comply with their objectives. Moreover, studies taking only Indian equity funds performance analysis contradict this hypothesis of underperformance of equity mutual funds as discussed above. Numerous studies have rejected or shown doubts on the Indian equity markets efficiency (e.g., Malafeyev, Awasthi, and Kambekar, 2017; Dicle, Beyhan, and Yao, 2010; Gupta, and Basu, 2007). The market inefficiency may allow fund managers to beat the market through superior security selection (Białkowski, and Otten, 2011)

Determinants of mutual fund performance

Researchers such as Dong, Feng, and Sadka, (2014), Foran, Niall, and Sullivan (2014), and Huang (2015) have tried to explore the determinants of mutual fund performance and selection, such as fund past performance (performance persistence in mutual funds), size (fund size erodes performance), age (effect of fund's age on performance), front and back end loads (funds charging high load may earn more), family size (funds may enjoy economies of scale with family size), turnover, fund flows (net positive fund flow may generate higher return) , expenses (effect of fees on performance), and timing (timing ability of fund managers). This may be among the few mutual fund studies to examine the evidence of a liquidity as factor for measuring fund performance

Liquidity as Determinants of mutual fund performance

More recently, researchers such as Dong, Feng and Sadka (2019), Huang (2015) and Ferreira, Keswani, Miguel and Ramos (2013) suggest that liquidity is one of the determinants of mutual funds performance. The liquidity is priced: investment in illiquid assets expect an additional return to compensate additional illiquidity of assets. An additional expected return from illiquid securities is called illiquidity premium for compensating risk of locking up investment for a greater time than liquid securities.
Liquidity is a dynamic variable; it is time varying and changing with market volatility (Chulia, Koser, and Uribe, 2020). It is not necessary that investment in liquid securities offer protection to

funds at inopportune times. Funds may hold securities, which are liquid in stable market conditions and become illiquid in stressed market condition. On average, funds perform below a threshold level during turbulence, thereby encouraging investors to withdraw their funds (Morris, Shim, and Shin, 2017). Mmeanwhile, volatility and preferences for liquid assets both increases, and consequently, the price of liquidity tends to rise (Hibbert et al 2009, and Acharya and Pedersen, 2019).

Liquidity provision (redemption of investment) is a basic obligation for an open-end fund (OEF). When a current customer submits requests for a redemption to Asset Management Company (AMC), an amount is credited back to his/her account at the current net asset value (NAV). However, this creates risks for fund managers, as funds offer perfect liquidity by offering daily redemption to investors, whereas assets in underlying portfolio are not perfectly liquid (Financial Stability Board, 2017). Normally, OEF holds enough cash in its portfolio to meet daily redemption requirements, instead of investing them in high yielding illiquid assets (Huang, 2015; Chernenko and Sunderam, 2016) and do not make changes in portfolio when any redemption request is submitted. But in case an institutional investor offloads a large number of shares, then OEF must sell some securities and rebalance the fund portfolio to pay the redemption amount (Zeng, 2017). Mutual funds which those are pooling capital in illiquid assets (including unlisted securities and properties), are willing to pass maximum liquidity transformation benefits to their investors. However, the probability of breaching daily redemption obligations become obvious, especially in stressed market conditions (Financial Stability Board, 2017). With the existence of illiquidity premium, fund managers must make a tradeoff between redemption risk and illiquidity premium. That is why fund managers would like to balance portfolios with both liquid and illiquid assets, so that they can enjoy a premium and mitigate redemption risks as well. Consequently, some illiquid funds gain illiquidity premium, which is lesser than the available illiquidity premium in the market.

Liquidity Dimensions and liquidity measures

Liquidity has multifaceted dimensions (Gaurav, and Misra, 2015, Holden, Jacobsen, and Subrahmanyam, 2014), and four commonly known dimensions are: (i) breath (Bid-Ask spread), (ii) depth (volume traded), (iii) immediacy (speed of transaction) and (iv) resiliency (recovery of traded price). Breath/width is the difference between bid and ask price of security (Bid-Ask spread). A narrow bid-ask spread is a proxy of liquid security and wide differences reflect illiquid securities. However, this measure of liquidity does not consider tradable quantities between the spread. Nevertheless, the depth dimension of liquidity measures the total tradable volume between the bid-ask spread. Thus bid-ask spread widens with increase in total tradable volume of a stock, and so does liquidity cost. Further, the immediacy dimension considers how quickly or how long it takes to conduct a transaction. Finally, the resilience dimension determines how long it may take for the post-trade price to return to the pre-trade price.

Besides, each measure or proxy of liquidity (e.g., price impact, volume, transaction cost) may capture certain single dimensions of liquidity and generate different outcomes. For example, the Amihud and Mendelson (1986) transaction cost (proxied by bid-ask spread) captures trading cost; Datar, Nik, and Radcliffe (1998) volume (turnover ratio) captures the trading quantity; Amihud (2002) and Pastor (2003) price impact captures the price reaction to trading volume. Moreover, there is no agreement about the fitness of a single best measure. A long literature starting with Malkiel (1977), Lee et al. (1991), Nanda, Narayanan & Warther (2000), Datar (2001), Varma (2002), Cherkes et al. (2009), Cullinan, & Zheng (2014) argues for miscalculation of illiquid assets in underlying portfolio of funds. But no model or tool was available in their era to quantify the

miscalculation. Hence a more holistic liquidity model is borrowed from Bloomberg LP, based on transient impact measure of liquidity, which cover all four dimensions of liquidity. Bloomberg liquidity assessment tool (LQA) assesses an asset's liquidity, considering transaction costs, time, and spread among different quantities. Basically, the market impact model is given by Kyle (1985) as a permanent impact model, and later Bouchaud et al (2004) and Lillo and Farmer (2004) updated this, on the framework of the transient market impact model. Gatheral (2010) extended it to continuous time. Market impact records the effect of a buy or sell oriented order execution, on price of security, where respective signs of orders determine buy and sell intentions. A number of overlapping orders may be placed at the same time in the market. Market impact approach decouples the effect of specific order on price of security from the effect of other orders. Therefore, the contribution of each transaction is recorded in the price formation process.

3. Theoretical Framework and Hypothesis Development

Although the Financial Crisis of 2008-2009 had rehabilitated the researcher's attentions towards liquidity management, it is still a historical topic which has been well discussed in finance related theories. The earliest theory was introduced in 1936 by John Maynard Keynes. He defined the liquidity preference theory as the relationship between interest rates and demand for money. According to the theory, an investment in long term securities demands for a higher return (interest rate premium) than those of short-term securities, because investors must sacrifice liquidity in the short run when he/she invests in long term securities. Later, the discounted cash flow model was introduced by Williams, John Burr (1938), which based on the assumptions of frictionless market (In an efficient market, if two securities offer similar cash flows, their relative market values should not differ materially).

The most frequently used theory in the context of illiquidity premium is the Liquidity based Capital Asset Pricing Theory (LCAPM). Liquidity is one of the significant factors in asset pricing, proved with the help of numerous proxies of liquidity by different researchers (i.e., Pastor and Stambaugh, 2003; Acharya and Pedersen, 2005; Liu, 2006; Lee, 2011). LCAPM proposes that asset illiquidity is not a positive characteristic which is required by investors and therefore, demand for an additional return from illiquid asset is rational. Pastor and Stambaugh (2003) first introduce five-factor model by adding illiquidity factor (IML- excess return of illiquid securities over liquid securities) in Carhart (1997) four-factor model. Pastor and Stambaugh (2003) reported that IML (illiquidity factor) in relation with market return is even more significant than SMB (size), HML (value), and UMD (momentum) factors. According to Acharya and Pedersen (2005) contributed in the literature of LCAPM by adding commonality in illiquidity risk (the covariance between security illiquidity and market illiquidity), which carries a commonality risk premium, like illiquidity premium. They reveal three liquidity betas; which include covariances between: (1) security liquidity and market liquidity; (2) security return and market liquidity; and (3) security liquidity and market returns, where expected return of a security is positively affected by the first type of liquidity beta and negatively affected by the second and third types of liquidity beta.

Research Hypothesis

Illiquidity Premium at Security Level

The first hypothesis is based on the relationship between illiquidity and the return of respective equity security. Initially, Pastor and Stambaugh (2003) and Acharya and Pedersen (2005) reported

an illiquidity premium of 7.5% and 3.5% respectively in the US stock markets. As international evidence, Amihud et al. (2015) analysed illiquidity premium across 45 countries (19 emerging, and 26 developed countries) using the Amihud (2002) illiquidity ratio and reported significant average positive illiquidity premium across countries ranging between 0.45% to 0.83%. Meanwhile, they reported illiquidity premium for the Indian security market ranging from 1.9% to 2.4% per month. Other scholars such as Lee (2011), Chinag and Zheng (2015), and Amihud (2014) also reported positive illiquidity premiums in developed markets. Similarly, Bekaert, et. al. (2007) examined the illiquidity premium in 19 emerging stock markets and reported an average premium of 3.3% to 7.7%. However, Sterenczak, Zaremba, and Umar (2020) were unable to prove the existence of illiquidity premium in 22 frontier markets. According to Amihud (2018), the insignificant evidence of illiquidity premium may appear like insignificant market excess return in some subperiods, it does not mean that illiquidity is not priced.

Extensive proof of significant illiquidity premium in the equity market by researchers show that securities with similar return history but different levels of illiquidity, may offer different market values. For example, Garbade (1984), Kamara (1994), and Amihud and Mendelson (1991) studied the yield spread between treasury notes and treasury bills of the same maturities and found that treasury notes on average, earn more than treasury bills; and concluded that treasury notes are more illiquid than treasury bills.

The above discussion can be summarized in the following hypothesis:

Hypothesis 1: Illiquid equity securities of India generate better returns than liquid equity securities.

Illiquidity Premium at Fund Level

Illiquidity premium is well documented and significantly proved in literature at the security level, but at the open-ended funds level, mixed results have been observed. According to Chordia, Jiang, and Tang, (2016), since small funds typically own illiquid stocks, they beat large cap funds. Large cap funds hold liquid securities which minimize their transaction costs but erode illiquidity premium. Barth, and Monin (2020), studied US hedge funds and reported significant illiquidity premiums of 3.4% per year. They find that illiquidity is one of the important determinants of the returns of funds. Cullinan and Zheng (2014) argued for illiquidity benefits of holding level 2 and 3 securities, over holding of level 1 securities by mutual funds.[4] Yan (2008) found an inverse relationship between fund size and fund performance, that even an inversed relationship was stronger among less liquid funds. According to Yan (2008), with an increase in fund size, the respective liquidity of fund also increases and erodes illiquidity premium. According to Otten and Reijnders (2012), small caps funds (proxied by illiquid funds) provide a significant alpha of 4.08% per annum; in contrast to large caps funds (proxied by liquid funds) in the UK. Idzorek, Xiong, Ibbotson (2012) studied US funds and showed that illiquid funds (funds held illiquid securities) generated an additional return of 2.65% more than liquid funds (funds held liquid securities). Interestingly, illiquid funds recorded their best performances during market downturn compared to liquid funds. According to Idzorek et al. (2012), due to high liquidity, liquid fund managers may have preferred to trade during market downturn and intensified their losses. Aragon (2007) and Agarwal, Daniel, Naik (2004) reported that funds with longer lockup and restriction periods are

[4] In US GAAP (ASC 820), level 2 and 3 are proxy for illiquid securities and level 1 for liquid securities.

associated with better performance, suggesting that investors in such funds are compensated for the lack of liquidity.

Nevertheless, other groups of researchers have found either negative or zero illiquidity premium at the mutual fund level. Khandani and Lo (2011) applied autocorrelation in fund returns as a measure of illiquidity and reported positive illiquidity premiums in hedge and fixed income funds; but their size and value sorted equity portfolios did not find evidence of illiquidity premium. Foran and Sullivan (2014) also showed results of insignificant liquidity premiums in the UK mutual fund market. Illiquidity premium was negatively priced as an individual stock characteristic (illiquid stocks underperform liquid stocks), and illiquidity as systematic risk also failed in explaining mutual fund returns. Foran, and Sullivan (2014) concluded that UK mutual funds are constructing their portfolios with liquid stocks, as liquidity instead of illiquidity is priced in their market. The negative illiquidity premium in mutual funds, on the other hand, is reasonable because the illiquidity premium at the security level is similarly negative in their analysis. Secondly, Foran and Sullivan (2014) employ a data set that spans the entirety of the financial crisis. During times of crisis, mutual fund managers allocate more of their funds to liquid assets. (Huang, 2015; Brunnermeier and Pedersen 2009). According to Huang (2015), on average, equity mutual funds maintain a ratio of 01 to 0.8 between an increase in expected market volatility and an increase in cash holdings of funds. Huang (2015) reported that this dynamic liquidity preference of fund managers brought higher returns for them. This indicates that illiquid funds that are temporarily converted to liquid funds perform better than identical funds that do not have such preferences, during times of crisis only. As a result, Huang's (2015) negative liquidity premium is only partial, and it is based on the return difference between dynamic and non-dynamic funds rather than liquid and illiquid funds. The above discussion can be summarized in the following hypothesis.

Hypothesis 2: Illiquid OEFs on consensus generate better returns than liquid OEFs.

Commonality in Illiquidity Premiums

Instead of cross-sectional variations, the commonality in illiquidity considers time-series pattern in illiquidity, which share a common component in the illiquidity of different securities available in the markets (Holden, Jacobsen and Subrahmanyam, 2014). Commonality in the illiquidity premium of Amihud et al. (2015) is different from commonality in illiquidity reported by Chordia et al. (2000), Brockman and Chung (2002), Acharya and Pedersen (2005) and Karolyi et al. (2012). It is common in illiquidity premium instead of illiquidity level. Commonality in illiquidity premium represents positive covariance between individual or market illiquidity premium and global or regional market illiquidity premium (Amihud et al., 2015). Daniel and Titman (1997) defined the difference between a security feature, and risks of that feature. When illiquidity of a security is one of the determinants of its return, illiquidity is the feature of that security, whereas commonality in illiquidity premium is a non-diversified systematic risk of a security which covaries with market wide illiquidity premium.

There are significant common components in illiquidity, at market and industry levels (Chordia et al., 2000; Huberman, and Halka, 2001), across countries (Karolyi et al., 2012), in emerging markets (Bai, and Qin, 2015), in Asian markets (Yu, Fung, and Tam, 2010), and in global markets (Brockman, Chung, and Christophe 2009; Amihud et al., 2015). Thus, a significant commonality in the illiquidity premium suggests that it is difficult for fund managers to diversify funds component securities against illiquidity shocks, because of the co-variation between illiquidity

premium of the market and available securities. Moreover, Hagströmer et al. (2013) recomposed illiquidity premium into three types of risks, (i.e., first, commonality in illiquidity; second, covariance between security return and market illiquidity; and third, covariance between security illiquidity and market return) and found that commonality in illiquidity is the least significant risk among the three. Correlated trading culture is one of the demand-intended sources of commonality in illiquidity (Suraj and Krishna, 2019; Karolyi et al., 2012), which is induced by foreign participants, institutional investors, index trading and mutual funds. According to Koch, Ruenzi, and Starks (2009), securities in which mutual funds show enormous holdings, also exhibit illiquidity commonality. With the growing size of the mutual fund industry in India, equity fund managers may have been involved in correlated trading which give rise to the common variation in illiquidity between mutual funds and stocks. Above discussions lead to the following hypothesis.

Hypothesis 3: There is a commonality in illiquidity premium of Indian equity funds portfolio and Indian equity market portfolio.

4. Data and Methodology

This section describes the data sources and sample construction, the screening procedures, and measures of commonality in illiquidity.

Sample construction

The study covers actively managed open-ended equity funds that traded in India from January 2007 to Jun 2019. To extract basic information of funds and construct a sample, we are using the FSRC (fund screening) function of the Bloomberg application. It generates a list of OEFs based on given criteria.[5] Over our sample, there were 546 equity OEFs in the initial sample. In order to select actively managed equity funds/OEFs, we classify OEFs that align at least 80% of their investment in equity securities[6]. Secondly, we classify emerging Asian OEFs that exclusively invest in the Asian region. That is, 80% of their total investment of OEFs should be in the Asian or domestic region. After filtering with a region-based filter, our sample size is left with 284 OEFs. Thirdly, following Kacperczyk, Marcin, Sialm, and Zheng (2008), we exclude those OEFs whose total assets are less than USD 5 million, and whose inception dates are after 01/01/2007. Thus, our sample size is narrowed down to 230 OEFs.

The information of securities holdings in the underlying portfolio of each OEF is derived from the Bloomberg portfolio database. This database provides basic details of current and backdated holding positions of funds, i.e., security name, weights (based on share price and number of shares held), and allocation of securities across sector and country. However, some OEFs do not report a 100% of their holdings on quarterly basis, and the database may lack consistent quarterly reporting. Under such condition, we will carry forward the last holding data reported for next quarter. However, we excluded from our sample the OEFs which have not updated their holding data for more than a year.

[5] Bloomberg application is function based database. To extract any data from Bloomberg it requires unique mnemonic (a short, memorable name) called function. Funds appears with specific Bloomberg ticker symbol, containing fund name abbreviation, country code, and type of security (i.e. equity, currency, commodity etc.)

[6] According to SEC 35d-1 rule if a mutual fund is assigned with standardized industry focus classification, then it should clearly declare in prospectus that at least 80% of its funds will be invested in that class of industry.

We have chosen the BSE 500-S&P index as a benchmark of India's stock market to derive market return and liquidity data. The S&P BSE 500 comprises of 500 Indian companies which covers almost 88% of total equity market capitalization. The Datastream provides return on benchmark indices. All the return on benchmark index is the sum of capital and dividend gains. It reports the stock return index (RI), which controls stock splits and dividends to the nearest hundredths.

Measuring Illiquidity

Stock liquidity data is also collected from the Bloomberg liquidity database. Bloomberg's liquidity solution for equities is a combination of different models, which is fundamentally based on the approach of transient market impact. Bouchaud (2010) defines the transient impact model as:

$$P_t = P_o + \lambda \sum_{n=0}^{N-1} \quad \epsilon_n \, v_n^{\Psi} \, G(N-n) \qquad (1)$$

Where
Pt = price at trade$t$,
Po = current price
ϵ_n= sign of trade (+, -)
v_n = Volume at time n
Ψ = price impact exponent
$G(N-n)$ = Propagator of a single trade
λ =market impact parameter

According to Bouchaud (2010), price impact is a relationship between an upcoming order of buy or sell, and the consequent price change. A buy-oriented trade will move the last trade price up, and a sell-oriented trade will tend to move price down. Interestingly, if a trader makes two succeeding buy transactions, probably the first transaction will be less expensive than the second; because of the first transaction's upward impact on price.

To understand this mechanism, Bouchaud et al. (2004) elaborated a balance mechanism of limit orders and market orders. Since market orders allow immediate execution; that is some investors may need immediate execution of their orders without taking care of bid-ask spread cost and execute market orders. These kinds of investors may be regarded as liquidity demanders. On the other side, those who place limit orders act as liquidity providers. In a dealer market, liquidity providers are market makers. However, in an order driven electronic market, all participants may provide liquidity. Bagehot (1971) reported that market liquidity depends on the ability of market makers to correct the temporary gap in supply and demand by placing orders of buying and selling to facilitate trading at a narrow spread. A market maker generates profit equals to bid-ask spread, given that midpoint price does not change; while round turn trade (buy and sell trade simultaneously). In considering inventory risk, liquidity providers try to revert the price towards mean by controlling order flow, otherwise they must buy at high, and sell at low prices. Therefore, the price return to mean (mean reversion or resiliency) may be too strong and react simultaneously with trade; or too weak reacts later in future with decaying effect, in which propagator function $G(N-\mathrm{n})$ decays with time.

Formation of Liquidity sorted Portfolios of Funds

We evaluate the effect of illiquidity on fund returns by constructing illiquidity-based portfolios of funds (PoF), which act as a fund of funds. First, we sort the funds according to their fund level

illiquidity (FLL). The fund level illiquidity (FLL) is a result of the value weighted average liquidity of securities held by the fund portfolio. Weight represents a percentage of a fund's total assets, contributed by an individual security; and liquidity of an individual security is an outcome of liquidity model. However, unlike past research portfolios, liquidity is not scale independent here. As already explained, the liquidity proxy adopted in this study is sourced from the Bloomberg liquidity assessment tool (LQA), which covers liquidity cost of a given volume of a stock, in a given number of days. The relationship between liquidity cost and liquidity horizon (number of days) outputs is based on the joint probability distribution for a given volume, rather than a complex model. A simple example is illustrated in Appendix C.

After constructing the fund level illiquidity (FLL) of all sample funds, the next step is to sort them in an ascending order, and to distribute the liquidity sorted funds to construct a decile portfolio of funds (PoFs). The PoF is equally weighted portfolio (decile), and each fund occupies equal weight in a PoF. The most liquid funds are grouped into Decile 1, and the most illiquid funds into Decile 10. We compare the monthly return of most liquid PoF (Decile 1) with the monthly return of most illiquid PoF (Decile 10) and the differential return between them estimates illiquidity premium at fund level.

To begin with first holding-period, all the funds are sorted in ascending order according to their FLL of the previous holding period ($h-1$) and each fund weight in respective PoF equals to (N is number of funds in portfolio) in first holding period ($h+0$). Generally, rebalancing the portfolio to restore initial weights is a common practice in financial literature (Liu and Strong, 2008). That is, rebalancing the portfolio to equal weights at the start of a defined interval of three months and allocate the funds in PoF form one holding period to the next in our methodology. Here, rebalancing also involves reallocation, so that Decile 1 always shows the most illiquid bucket, and Decile 10 shows liquid bucket, in each period. If a fund performs worse/better than other funds of the portfolio, then we add (buy) or subtract (sell), the amount to restore initial weight, in the respective PoF. Thus, value buy or sell of fund *i* in a Decile *x* in next holding period is;

$$Buy\ (x)_{i,h+1} = \left[w_{i,h+0} + \left(-r_{i,1} * \frac{1}{N}\right)\right] if\ i \epsilon\ x\ in\ h+1 \quad (2)$$

$$Sell\ (x)_{i,h+1} = \left[w_{i,h+0} + \left(r_{i,1} * \frac{1}{N}\right)\right] if\ i \epsilon\ x\ in\ h+1 \quad (3)$$

Where

$r_{i,1}$ = fund *i*'s return in initial holding period
$w_{i,h}$= weight of fund *i,* in holding period *h+0* at the end of period.
$\frac{1}{N} = w_{i,h-1}$ = Number of funds in portfolio

Formation of Illiquidity Portfolios for the Market

This study also uses a portfolio approach to investigate whether illiquidity risk carries a return premium. Like the process of finding illiquidity premium at fund level, we repeat the process for illiquidity premium in the Indian stock market. We have chosen the BSE 500-S&P index as a benchmark of India's stock market. This time, we assess the illiquidity premium at stock level by forming illiquidity-based portfolios of stocks instead of funds. Again, ten decile portfolios of

stocks are formulated at the beginning of quarter (h+0), based on their illiquidity cost in period (h-1) and the monthly return of these portfolios are observed for the next three months. Like the fund analyses, rebalancing and reallocation perform at the start of the defined interval of three months. The additional return from illiquid over liquid portfolio of stock measures illiquidity premium at market level for compensating risk of locking up investment for a greater time than liquid securities.

Risk Factors

This study follows illiquidity premiums at fund level (FLLP), after the controlling of common risk factors of Indian equity market The risk adjusted FLLP is calculated from the regression of FLLP on risk factor following the Fama and French (1993) three factor model for the Indian market. The intercept of regression is gained as risk adjusted FLLP. The country factors we select for use as local factors for India are market excess return over risk free return rate (RM), small size minus big size return (SMB), and high minus low book to market ratio return (HML). The data of these risk factors is borrowed from the Indian finance database (IFD), like data provided at the Kenneth French website[7] for the US. This study classifies Indian OEFs that exclusively invest in the local market. That is, 80% of their total investment of OEFs should be in the domestic region. Thus, local country factors can deal in better ways compared to regional or global factors. Finally, adding local risk factors, the illiquidity premium of equally weighted equity funds portfolio is organized as;

$$FLLP_t = \alpha_{FLLP} + b_1\, RM_t + b_2\, SMB_t + b_3\, HML_t + \varepsilon_t \qquad (4)$$

And risk-adjusted stock level liquidity premium (IML) as.

$$IML_t = \alpha_{IML} + \beta_1\, RM_t + \beta_2\, SMB_t + \beta_3\, HML_t + \varepsilon_t \qquad (5)$$

The local market factor is the return on firms listed in the Bombay Stock Exchange (BSE), excluding firms with less than 50 trading days in one year minus the Indian 91-days Treasury bill rate [8]. Agarwalla, Jacob, and Varma (2014) used Fama and French's (1993) methodology to calculate the Fama/French three factors for the Indian stock market by dividing all stocks into six portfolios (BV, BN, BG, SV, SN and SG). First, they divide the stocks into two groups based on their size: big firms (B), which account for the top 10% of total market capitalization, and small firms (S), which account for the remainder. Then each group size is sub-divided into three value groups (Value (V), Neutral (N) and Growth (G)) based on the score of book value to market price per share of firms. Agarwalla et. al (2014, p. 6) explained the creation of the size factor (SMB), and value factor (HML)as follows:

"Put differently, SMB is the simple average of three return differences: *SG - BG, SN - BN* and *SV - BV*, each of which is a difference between two portfolios that are matched in terms of value and differ only in size. Similarly, the value factor HML (High minus Low) is defined as the simple average of two differences: *SV - SG* and *BV - BG*, each of which is a difference between two portfolios that are matched in terms of size and differ only in value. The HML factor is thus designed to capture the effect of value while being largely free of the influence of size."

[7] https:// mba. tuck. dartmouth. edu/ pages / faculty / ken . French /data_library.html)

[8] Firm covered in the Centre for Monitoring Indian Economy (CMIE) Prowess database.

5. Results

Illiquidity Premiums

Detailed funds and market level portfolio return statistics are provided in Table 1 - Panel A. Mean returns are almost monotonically decreasing from most illiquid (Port 1) to most liquid (Port 10) in both funds and stocks docile portfolios. The liquidity premiums (FLLP and IML) are outcomes of the average of return on three least-minus-most liquid portfolios, following Amihud et al. (2015). We also find correlation between monthly returns (averaged) of illiquid and liquid, fund and stock portfolios, with figures of 0.97 and 0.90 respectively, demonstrating a strong positive relation between illiquid and liquid portfolios return. Panel B in Table 1 presents the result of fund level illiquidity premium (FLLP) and illiquidity premium of Indian equity market (IML). Simultaneously it holds risk-adjusted fund level illiquidity premium (α_{FLLP}) estimated as intercept from model (4) and risk-adjusted illiquidity premium of Indian equity market estimated as intercept from model (5).

Table 1 Fund Level Illiquidity Premium (FLLP)

Panel A shows the mean return of fund and stock portfolios sorted by illiquidity level. For each PoF, at beginning of each quarter, funds are sorted into ten equal PoF, according to their fund level liquidity (FLL), which is value weighted average liquidity of securities held by fund portfolio. Same procedure is repeated for stock portfolios. Port1 shows the lowest liquidity decile portfolio and Port10 shows the highest liquidity decile portfolio. Then monthly returns are computed for each portfolio for the months t (0+1), t (0+2), t (0+3), and the portfolio formation process is repeated quarterly to restore initial weights for the next three months. Total return calculation added both, change in NAV (net asset value) and dividends distributed in respective period. It is assumed that dividends are reinvested through buying more shares of the same fund at ex-dividend date NAV. The return on illiquid and liquid portfolios is the average of three least and most liquid portfolios respectively. Panel B shows the monthly average of illiquidity premium of Indian equity funds, FLLP, the return on illiquid portfolio of funds (PoF) -minus-liquid portfolio of funds, and IML, the return on illiquid portfolio of stocks-minus-liquid portfolio of stocks. The α_{IML} and α_{FLLP} are the risk-adjusted illiquidity premium for the Indian equity and fund market from Indian three-factor model, respectively. α_{FLLP} is risk-adjusted fund level liquidity premium, stand as the intercept of regression of $FLLP_t$ on Indian region risk factors, following Fama and French (1993).

$$FLLP_t = \alpha_{FLLP} + b_1\, RM_t + b_2\, SMB_t + b_3\, HML_t + \varepsilon_t$$

α_{IML} is risk-adjusted stock level liquidity premium, stand as the intercept of regression of IML_t on Indian region risk factors, following Fama and French (1993).

$$IML_t = \alpha_{IML} + \beta_1\, RM_t + \beta_2\, SMB_t + \beta_3\, HML_t + \varepsilon_t$$

RM_t is the return on firms listed on Bombay Stock Exchange (BSE) in excess of Indian 91-days Treasury bill rate, SMB_t is the Indian size factor (small-minus-bid firms return) and HML_t is Indian value factor (high book value - low book value firms return). The statistics of $FLLP_t$ and IML_t, and the intercepts, and α_{FLLP} and α_{IML} are presented in Panel B.

Panel C displays the slope coefficients of Fama French (1993) three risk factors of Indian equity market. The t-statistics are in parenthesis below the factor value. Portfolios are formulated at beginning of quarter (h+0), based on their liquidity cost in period (h-1) and monthly return of these portfolios are noticed for next three months (h+1 to h+3). The t-statistics of variables are in parenthesis.

Panel A: Returns of Portfolios Sorted by Illiquidity Level, January 2008– December 2019

	Port1	Port2	Port3	Port4	Port5	Port6	Port7	Port8	Port9	Port10
Fund Portfolios	1.0065	1.077	0.828	0.904	0.982	0.8832	0.901	0.8782	0.458	0.6563
t-statistics	(2.48)	(2.05)	(2.14)	(2.14)	(2.33)	(2.08)	(1.96)	(2.09)	(0.92)	(1.00)
Stock Portfolios	1.0529	1.112	1.094	1.12	0.91	0.64	0.79	0.5373	0.5646	0.4629
t-statistics	1.99	2.38	2.21	2.33	1.35	1.18	1.15	0.6605	0.8527	0.7385

Panel B: Risk-adjusted fund and stock level liquidity premium (FLLP and IML)

	FLLP	α_{FLLP}	IML_t	α_{IML}
Mean	0.2734	0.285	0.553	0.5396
(t-static)	(2.405)	(3.195)	(2.074)	(2.759)
p-value	0.008	0.002	0.020	0.0066
Median	0.3033		1.260	

Panel C: Factors' slope coefficient

	Fund Level				Stock Level			
	RM_t	SMB_t	HML_t	R^2	RM_t	SMB_t	HML_t	R^2
Mean	0.0163	0.197	0.066	40.3%	0.2541	0.3062	-0.085	47.60%
(t-static)	(1.065)	(8.144)	(3.452)		(-7.6)	(5.803)	(-1.99)	
p-value	0.2885	0.0000	7E-04		5E-12	5E-08	0.049	

The results show that liquidity is not only priced in the Indian stock market, but also in the fund market. The illiquidity premium at fund level (FLLP) and stock level (IML) are positive and significant. Meanwhile, the risk-adjusted illiquidity premium of fund and stock are also positive and significant, being lesser in the fund market than they are in the stock market. Being financially meaningful, the illiquidity premium is 0.27% (t =2.40) per month at fund level (FLLP) and 0.55% (t = 2.07) at stock level (IML). The corresponding α_{FLLP} and α_{IML} are 0.28% (t = 3.19) and 0.539645 (t = 2.75) for fund and stock markets, respectively. This study also computes the cumulative returns of extreme illiquid and liquid portfolios formed as average return on three most illiquid and most liquid portfolios. Detailed statistics of cumulative returns are provided in Appendix C. We calculated the cumulative average returns of three extreme portfolios over an increasing time interval of one month, from July 2008 to December 2019. The cumulative liquidity premium-cumulative portfolio return of least-minus-most liquid portfolios, is positive throughout most of the time period, except for the crisis period of 2008 to 2009, finalizing at 85.18% (t=16.67) and 38% (t=19.33) for stocks and funds respectively, at the end of December 2019. These results comply with the view that liquid securities perform better than illiquid securities in a crisis period (Huang, 20150, Chen, Glodstein, and Jiang, 2010).

The Exposure of the Illiquidity Premium to Risk Factors

$FLLP_t$ *and* IML_t are regressed on Fama and French risk factors for Indian equity market, crops three slope coefficients, $b_1 - b_3$, for $FLLP_t$, and $\beta_1 - \beta_3$, for IML_t , of which results are shown in Panel C of Table 1. The coefficient b_1 of market excess return, RM_t, for the regression of $FLLP_t$ on risk factors is positive, and the coefficient β_1 of market excess return, RM_t, for the regression of IML_t on risk factors is negative. However, both coefficients, $b_1 \& \beta_1$, are insignificant, implying that the exact relationship between the fund or stock level illiquidity premiums and market return do not exist. Otherwise, we would have concluded that $FLLP_t$ rises in bullish market condition, and IML_t rises in bearish market condition (i.e., Amihud at al., 2015, prove the negative correlation between global illiquidity premium and the global market return).

The coefficients, b_2 and β_2, of the SMB factors (for both funds and stocks) in Panel C of Table 1 are positive and significant because firm size is the proxy of liquidity. Generally, investment in small firms is associated with illiquid investments, and large firms with liquid investment. According to Amihud and Mendelson (1986) illiquidity premium in stocks significantly contributes to size premium. Similarly, Otten and Reijnders (2012) shows illiquidity premium in mutual funds are segregated based on fund size. Moreover, the value of coefficient b_2 (equal to 0.20) is lesser than β_2 , (equal to 0.30), demonstrating that impact of SMB factor on IML_t is larger than $FLLP_t$.

The coefficient of the *HML* factors derived from model (4) for $FLLP_t$ is tiny but significant, implying that fund managers choosing illiquid (liquid) securities, are bearing high (low) book-to-market ratio. Like firm size, the book-to-market ratio is associated with liquidity, since value securities are more illiquid than growth securities (Amanda, and Husodo, 2015; and Liu, 2006). Thus, a part of illiquidity premium at fund level is due to value premium. Moreover, coefficient of the *HML* factor for IML_t is insignificant, denying for any relationship between the value premium and illiquidity premium.

Commonality in Illiquidity Premiums

Our final objective is to analyze the commonality between Indian equity funds illiquidity premium and Indian stock market illiquidity premium. In other words, the objective is to quantify the range to which fund level illiquidity premium covaries with the equity market wide illiquidity premium. The systematic variation in illiquidity-covariance between illiquidity of market and individual security, was first reported by Chordia, Roll and Subrahmanyam (2000). Moreover, commonality in illiquidity premium, speaks for the positive covariance between illiquidity premium of different equity markets, at global or regional levels; and this is common in countries which are open for foreign capital investment or those whose capital markets have global integration (Amihud et al., 2015). According to Brunnermeier and Pedersen (2009), trading illiquidity is a function of funding illiquidity. Therefore, variation in funding illiquidity, caused by margin requirements, financial constraints and regulations are translated into illiquidity premium, and could be the price of illiquidity (Amihud et al., 2015). Thus, this commonality in illiquidity premiums may show how fund-related regulations and provision are transmitted into the illiquidity premium of the stock market and vice-versa.

The fund level illiquidity premium; $FLLP_t$ and stock level illiquidity premium; IML_t are already measured up to this stage. Thus, our test employs the regression model, by adding IML_t the illiquidity premium factor to Model (4). The regression model for $FLLP_t$ is

$$FLLP_t = \alpha_{FLLP} + \alpha 1 IML_t + b_1 RM_t + b_2 SMB_t + b_3 HML_t + \varepsilon_t \quad (6)$$

Secondly our measure of fund level illiquidity premium, $FLLP_t$, also employ cross-section regression on IML_t and RM_t only, exclusive of the SMB and HML factors. Both factors are removed from Model (6) to regulate for the size and value effects, and IML_t denoted as IML_t^{SV}. The coefficient of stock illiquidity premium ($\alpha 1$) should be positive and greater than zero, to prove commonality- implies that $\alpha 1 > 0$.

Table 2 presents the coefficient of IML_t, α, and risk factor, $b_1 - b_3$, all are positive, implying that illiquidity premium exist in Indian equity fund market is driven by the Indian stock market illiquidity premium. Even the coefficient of RM_t, b_1, is also significant, which was insignificant in Model (4) being significant with addition of IML_t. The measure of commonality, $\alpha 1$, is positive and significant for IML_t, and IML_t^{SV}. However, decrease in R^2 from 43.22% to 13.11% of models, with and without SMB and HML factors, indicating the illiquidity premiums of both markets (fund and stock) are correlated. Indeed, IML_t is unable to explain variability in the $FLLP_t$ without size and value factors. These results are consistent with Amihud et al. (2015) with regard to significance of commonality (co-movement) in the illiquidity premiums (price of illiquidity).

Table 2 Commonality in illiquidity premiums

In Panel A, coefficients are outcome of monthly time series regression of fund level illiquidity premium, $FLLP_t$ on the stock level illiquidity premium, IML_t considering common risk factors for India (already explained).

$$FLLP_t = \alpha_{FLLP} + \alpha 1 IML_t + b_1 RM_t + b_2 SMB_t + b_3 HML_t + \varepsilon_t$$

Panel B show the commonality regression without SMB and HML factors, and $IML_t = IML_t^{sv}$. Panel C and panel D shows commonality in illiquidity premium of funds and stocks after controlling for stock market illiquidity, with (Panel C) and without (Panel D), SMB and HML factors. The t-statistics of variables are in parenthesis.

Panel A: Commonality in funds and stocks illiquidity premium with common risk factors

$FLLP_t$	IML_t	RM_t	SMB_t	HML_t	R^2
Mean	0.073	0.035	0.174	0.088	43.22%
t-statistics	2.627	2.113	6.835	4.264	
P-Value	0.010	0.036	0.000	0.000	

Panel B: Commonality in funds and stocks illiquidity premium with market return (RM_t)only

$FLLP_t^{sv}$	IML_t^{sv}	RM_t	R^2
Mean	0.093	0.085	13.11%
t-statistics	3.138	4.413	
P-Value	0.002	0.000	

Panel C: Commonality in $FLLP_t$ and IML_t controlling for market illiquidity, $IlliqM_t$

$FLLP_t$	IML_t	$IlliqM_t$	RM_t	SMB_t	HML_t	R^2
Mean	0.071	-0.021	0.036	0.173	0.085	43.93%
t-statistics	2.560	-1.301	2.140	6.808	4.120	
P-Value	0.012	0.195	0.034	0.000	0.000	

Panel D: Commonality in $FLLP_t^{sv}$ and IML_t^{sv} controlling for market illiquidity, $IlliqM_t$

$FLLP_t$	IML_t	$IlliqM_t$	RM_t	R^2
Mean	0.091	-0.033	0.084	14.80%
t-statistics	3.103	-1.661	4.413	
P-Value	0.002	0.099	0.000	

Commonality in Illiquidity Premium versus Commonality in Illiquidity

According to Amihud et al., (2015) commonality in illiquidity does not lead to commonality in illiquidity premium. That is commonality in illiquidity premium of Amihud et al., (2015) is different from commonality in illiquidity revealed by Karolyi, Lee, and van Dijk (2012), Liu and Wang (2012); Hameed, Kang, and Viswanathan (2010); Chordia, Roll, and Subrahmanyam (2000). Thus, we test whether variation in fund level illiquidity premium is defined by variation in stock market illiquidity instead of stock level illiquidity premium. We are adding stock market illiquidity as a characteristic into the basic Model (6) of commonality in illiquidity premiums to assess its effect on coefficient of commonality in illiquidity premium. The estimated model is as follows:

$$FLLP_t = \alpha_{FLLP} + \alpha 1 IML_t + \alpha 2 IlliqM_t + b_1 RM_t + b_2 SMB_t + b_3 HML_t + \varepsilon_t \qquad (7)$$

In the literature, illiquidity commonality is proven by the significance of coefficient of market liquidity (Zhang, Cai, Cheung, 2009; Koch, Ruenzi, Starks, 20010), and regression R^2 (Hameed et al., 2010; Chordia at al., 2000). Therefore, the question here is whether the addition of market illiquidity variable in Model (6) will halt the statistical significance and magnitude of coefficient $\alpha 1$, or alter the regression R^2, or remain ineffective. The market illiquidity variable, $IlliqM_t$, is equally weighted average liquidity of securities/members held by the BSE500 index. Indeed, stock market index is taken as market portfolio. The market illiquidity is constructed on monthly basis, so that it is concurrent with other variables. IML_t^{SV} is constructed to pull out size and value factors, SMB_t and HML_t, from Model (6). We remove SMB_t and HML_t, and only remain with return factor RM_t in Model (7). If we observe a decline in value of coefficient $\alpha 1$ with the addition of $IlliqM_t$, we may conclude that commonality in illiquidity drive the commonality in liquidity premium. However, Table 2 Panels C and D show that $IlliqM_t$ fails to decline size and significance of coefficient $\alpha 1$, and remain the same as estimated in Model (6). Moreover regression R^2 shows a minute increment of 0.71% for IML_t and 1.74% for IML_t^{SV}. The coefficients of both IML_t and IML_t^{SV} are positive and significant. Consistent with Amihud et al. (2015), our results confirm that commonality in illiquidity does not lead to commonality in illiquidity premium. Commonality in illiquidity premium is associated with illiquidity premiums of both markets.

6. Conclusion

This study provides enough evidence that besides stock illiquidity, the fund illiquidity is also priced in Indian financial markets. Both illiquid portfolios, holding illiquid stock and illiquid funds, generated higher returns than their respective less illiquid stocks and fund portfolios, after controlling for three risk factors (the market, size, and B/M factors). The average risk-adjusted monthly illiquidity premium in stocks and equity funds is 0.55% and 0.27% respectfully. Both premiums are statistically significant. A lower illiquidity premium in funds than available premium in equity market, would cause liquidity and other financial constraints raised by regulatory authorities specifically for open-ended mutual funds. The risk-adjusted illiquidity premium estimated as intercept of illiquidity premiums regression on risk factors are 29% at fund level and 54% at stock level; and that both are statistically significant.

Indeed, we find commonality between illiquidity premiums across Indian equity funds and stocks. After correcting for common risk factors, a fund level illiquidity premium covaries significantly and positively with the stock level illiquidity premium. Further, tests prove that stock market illiquidity does not lead to the commonality in illiquidity premiums, as an addition of stock market illiquidity into commonality regression does not change the significance and the magnitude of commonality coefficient.

In summary, we report a positive and significant fund and stock illiquidity premium. However, on average, equity fund managers may have no ability to grab enough illiquidity premium from the stock market with given financial constraints. Moreover, illiquidity premium in funds is almost half of the stock, but it shares a commonality pattern with illiquidity premium of stocks.

References

Acharya, V. V., & Pedersen, L. H. (2005). Asset pricing with liquidity risk. *Journal of financial Economics*, *77*(2), 375-410.

Acharya, V. V., & Pedersen, L. H. (2019). Economics with Market Liquidity Risk. *Critical Finance Review, special issue on "Liquidity: Replications, Extensions, and Critique", Forthcoming, NYU Stern School of Business*

Agarwal, V., Daniel, N. D., & Naik, N. Y. (2004, July). Flows, performance, and managerial incentives in hedge funds. In *EFA 2003 Annual Conference Paper* (No. 501).

Agarwal, P. K., & Pradhan, H. K. (2018). Mutual fund performance using unconditional multifactor models: Evidence from India. *Journal of Emerging Market Finance*, *17*(2_suppl), S157-S184.

Agarwalla, S. K., Jacob, J., & Varma, J. R. (2014). Four factor model in Indian equities market. *Indian Institute of Management, Ahmedabad Working Paper*, (2013-09), 05.

Akbas, F., Boehmer, E., Genc, E., & Petkova, R. (2010). The time-varying liquidity risk of value and growth stocks. *Available online at*: http://ssrn.com/abstract=1572763.

Almeida, H., Campello, M., Cunha, I., & Weisbach, M. S. (2014). Corporate liquidity

management: A conceptual framework and survey. *Annual Review Financial Economics*, *6*(1), 135- 162.

Amanda, C., & Husodo, Z. A. (2015). Empirical test of Fama French three factor model and illiquidity premium in Indonesia. *Corporate Ownership & Control Journal*, *12*(2).

Amihud, Y., & Mendelson, H. (1986). Asset pricing and the bid-ask spread. *Journal of financial Economics*, *17*(2), 223-249.

Amihud, Y., & Mendelson, H. (1991). Liquidity, maturity, and the yields on US Treasury securities. *The Journal of Finance*, *46*(4), 1411-1425.

Amihud, Y. (2002). Illiquidity and stock returns: cross-section and time-series effects. *Journal of financial markets*, *5*(1), 31-56.

Amihud, Y., Hameed, A., Kang, W., & Zhang, H. (2015). The illiquidity premium: International evidence. *Journal of Financial Economics*, *117*(2), 350-368.

Amihud, Y. (2018). Illiquidity and stock returns: A revisit. *Critical Finance Review, Forthcoming*.

Anderson, R. G., Binner, J. M., Hagströmer, B., & Nilsson, B. (2015). *Does commonality in illiquidity matter to investors?* (No. 2015-02). Birmingham Business School Discussion Paper Series.

Aragon, G. O. (2007). Share restrictions and asset pricing: Evidence from the hedge fund industry. *Journal of Financial Economics*, *83*(1), 33-58.

Association of Mutual Funds in India. "Research & Information and Industry Data." https://www.amfiindia.com/indian-mutual (accessed 15 June 2020).

Association of Mutual Funds of India (2020). AMFI press release. Retrieved from: https://www.amfiindia.com/Themes/Theme1/downloads/AMFIApril242020PressRelease.pdf

Bai, M., & Qin, Y. (2015). Commonality in liquidity in emerging markets: Another supply-side explanation. *International Review of Economics & Finance*, *39*, 90-106.

Bagehot, W. (1971). The only game in town. *Financial Analysts Journal*, *27*(2), 12-14.

Barth, D., & Monin, P. (2020). Illiquidity in Intermediate Portfolios: Evidence from Large Hedge Funds. *OFR WP*, 20-03.

Bekaert, G., Harvey, C. R., & Lundblad, C. (2007). Liquidity and expected returns: Lessons from emerging markets. *The Review of Financial Studies*, *20*(6), 1783-1831.

Benić, V., & Franić, I. (2008). Stock market liquidity: comparative analysis of Croatian and

regional markets. *Financial theory and practice*, *32*(4), 477-498.

Benos, E. and Jochec, M. (2011), "Short term persistence in mutual fund market timing and stock selection abilities", Annals of Finance, Vol. 7 No. 2, pp. 221-246.

Bhagyasree, N., & Kishori, B. (2016). A study on performance evaluation of mutual funds schemes in India. *International Journal for Innovative Research in Science & Technology*, *2*(11), 812-816.

Board, F. S. (2017). Policy recommendations to address structural vulnerabilities from asset management activities. *Policy document*.

Bouchaud, J. P., Gefen, Y., Potters, M., & Wyart, M. (2004). Fluctuations and response in financial markets: the subtle nature of 'random price changes. Q*uantitative finance*, *4*(2), 176-190.

Bouchaud, J. P. (2010). Price impact. *Encyclopedia of quantitative finance*.

Brown, S. J., Sotes-Paladino, J., Wang, J. G., & Yao, Y. (2017). Starting on the wrong foot: Seasonality in mutual fund performance. *Journal of Banking & Finance*, *82*, 133-150.

Brockman, P., Chung, D. Y., & Pérignon, C. (2009). Commonality in liquidity: A global perspective. *Journal of Financial and Quantitative Analysis*, *44*(4), 851-882.\

Brockman, P., & Chung, D. Y. (2002). Commonality in liquidity: Evidence from an order-driven market structure. *Journal of Financial Research*, *25*(4), 521-539.

Brunnermeier, M. K., & Pedersen, L. H. (2009). Funding liquidity and market liquidity. *Review of Financial Studies*, *22*(2201-2238), 6.

Busse, J. A., Chordia, T., Jiang, L., & Tang, Y. (2016). Mutual fund transaction costs.

Chang, Y. T., Gau, Y. F., & Hsu, C. C. (2016, February). Liquidity Commonality During the Financial Crisis: Effects of News Announcements. In *Asian Finance Association (AsianFA) 2016 Conference*.

Cherkes, M., & Sagi, J. R. Stanton (2009), "A Liquidity-Based Theory of Closed- End Funds". *Review of Financial Studies*, *22*, 257-297.

Chen, Q., Goldstein, I., & Jiang, W. (2010). Payoff complementarities and financial fragility: Evidence from mutual fund outflows. *Journal of Financial Economics*, *97*(2), 239-262.

Chernenko, S., & Sunderam, A. (2016). *Liquidity transformation in asset management: Evidence from the cash holdings of mutual funds* (No. w22391). National Bureau of Economic Research.

Chordia, T., Roll, R., & Subrahmanyam, A. (2000). Commonality in liquidity. *Journal of financial economics*, *56*(1), 3-28.

Coughenour, J. F., & Saad, M. M. (2004). Common market makers and commonality in liquidity. *Journal of Financial economics*, *73*(1), 37-69.

Cullinan, C. P., & Zheng, X. (2014). Valuation scepticism, liquidity benefits and closed-end fund premiums/discounts: evidence from fair value disclosures. *Accounting & Finance*, *54*(3), 729-751.

Chuliá, H., Koser, C., & Uribe, J. M. (2020). Uncovering the time-varying relationship between commonality in liquidity and volatility. *International Review of Financial Analysis*, 101466.

Datar, V. (2001). Impact of liquidity on premia/discounts in closed-end funds. *The Quarterly Review of Economics and Finance*, *41*(1), 119-135.

Datar, V. T., Naik, N. Y., & Radcliffe, R. (1998). Liquidity and stock returns: An alternative test. *Journal of Financial Markets*, *1*(2), 203-219.

Deli, D. N., & Varma, R. (2002). Closed-end versus open-end: the choice of organizational form. *Journal of Corporate Finance*, *8*(1), 1-27.

Daniel, K., & Titman, S. (1997). Evidence on the characteristics of cross sectional variation in stock returns. *the Journal of Finance*, *52*(1), 1-33.

Garbade, K. (1984). Analyzing the structure of Treasury yields: Duration, coupon, and liquidity effects. *Topics in Money and Securities Markets*.

Fama, E. F., & French, K. R. (1993). Common risk factors in the returns on stocks and bonds. J*ournal of financial economics*, *33*(1), 3-56.

Ferreira, M. A., Keswani, A., Miguel, A. F., & Ramos, S. B. (2013). The determinants of mutual fund performance: A cross-country study. *Review of Finance*, *17*(2), 483-525.

Board, F. S. (2017). Policy recommendations to address structural vulnerabilities from asset management activities. *Policy document*.

Foran, J., & O'Sullivan, N. (2014). Liquidity risk and the performance of UK mutual funds. *International Review of Financial Analysis*, *35*, 178-189.

Frino, A., & Gallagher, D. R. (2001). Tracking S&P 500 index funds. *The Journal of Portfolio Management*, *28*(1), 44-55.

Gatheral, J. (2010). No-dynamic-arbitrage and market impact. *Quantitative finance*, *10*(7), 749-759

Hameed, A., Kang, W., & Viswanathan, S. (2010). Stock market declines and liquidity. *The Journal of Finance*, *65*(1), 257-293.

Hagströmer, B., Hansson, B., & Nilsson, B. (2013). The components of the illiquidity premium: An empirical analysis of US stocks 1927– 2010. *Journal of Banking & Finance*, *37*(11), 4476-4487.

Hasbrouck, J., & Seppi, D. J. (2001). Common factors in prices, order flows, and liquidity. *Journal of financial Economics*, *59*(3), 383-411.

Hibbert, J., Kirchner, A., Kretzschmar, G., Li, R., & McNeil, A. (2009). Liquidity Premium: Literature review of theoretical and empirical evidence. *Barrie & Hibbert research report*.

Holden, C. W., Jacobsen, S., & Subrahmanyam, A. (2014). The empirical analysis of liquidity. *Foundations and Trends® in Finance*, *8*(4), 263-365.

Huberman, G., & Halka, D. (2001). Systematic liquidity. *Journal of Financial Research*, *24*(2), 161-178.

Huang, J. (2015, June). Dynamic liquidity preferences of mutual funds. In *AFA 2009 San Francisco Meetings Paper*.

Idzorek, T. M., Xiong, J. X., & Ibbotson, R. G. (2012). The liquidity style of mutual funds. *Financial Analysts Journal*, *68*(6), 38-53.

Kacperczyk, M., Sialm, C., & Zheng, L. (2008). Unobserved actions of mutual funds. *The Review of Financial Studies*, *21*(6), 2379-2416.

Kamara, A. (1994). Liquidity, taxes, and short-term treasury yields. *Journal of Financial and Quantitative Analysis*, *29*(3), 403-417.

Karolyi, G. A., Lee, K. H., & Van Dijk, M. A. (2012). Understanding commonality in liquidity around the world. *Journal of Financial Economics*, *105*(1), 82- 112.

Khandani, A. E., & Lo, A. W. (2011). Illiquidity premia in asset returns: An empirical analysis of hedge funds, mutual funds, and US equity portfolios. *The Quarterly Journal of Finance*, *1*(02), 205-264.

Koch, A., Ruenzi, S., & Starks, L. (2016). Commonality in liquidity: a demand-side explanation. *The Review of Financial Studies*, *29*(8), 1943-1974.

Kumar, G., & Misra, A. K. (2015). Closer view at the stock market liquidity: A literature review. *Asian Journal of Finance & Accounting*, *7*(2), 35-57.

Kumar, S., & Prasanna, K. (2019). Global Financial Crisis: Dynamics of Liquidity Risk in Emerging Asia. *Journal of Emerging Market Finance*, *18*(3), 339-362.

Kyle, A. S. (1985). Continuous auctions and insider trading. *Econometrica: Journal of the Econometric Society*, 1315-1335

Lemeshko, O., & Rejnuš, O. (2015). Performance evaluation of equity mutual funds in countries with emerging economies: Evidence from BRIC, CEE, sea and MENA regions. *Procedia Economics and Finance*, *30*, 476-486.

Lee, C. M., Shleifer, A., & Thaler, R. H. (1991). Investor sentiment and the closed- end fund puzzle. *The Journal of Finance*, *46*(1), 75-109.

Lesmond, D. A. (2005). Liquidity of emerging markets. *Journal of financial economics*, *77*(2), 411-452.

Lillo, F., & Farmer, J. D. (2004). The long memory of the efficient market. *Studies in nonlinear dynamics & econometrics*, *8*(3).

Liu, H., & Wang, Y. (2012). *A Theory of Demand Driven Liquidity Commonality*. Working Paper Washington University in St. Louis, Missouri.

Liu, W., & Strong, N. (2008). Biases in decomposing holding-period portfolio returns. *The Review of Financial Studies*, *21*(5), 2243-2274.

Liu, W. (2006). A liquidity-augmented capital asset pricing model. *Journal of financial Economics*, *82*(3), 631-671.

Lo, A. W., Petrov, C., & Wierzbicki, M. (2006). It'S 11 Pm—Do You Know Where Your Liquidity Is? The Mean–Variance–Liquidity Frontier. In *The World Of Risk Management* (pp. 47-92).

Koch, A., Ruenzi, S., & Starks, L. T. (2010). Commonality in liquidity: a demand- side explanation. Working Paper. *McCombs School of*, University-of.

Malkiel, B. G. (1995). Returns from investing in equity mutual funds 1971 to 1991. *The Journal of finance*, *50*(2), 549-572.

Malkiel, B. G. (1977). The valuation of closed-end investment-company shares. *The Journal of Finance*, *32*(3), 847-859.

Mateus, I. B., Mateus, C., & Todorovic, N. (2019). Use of active peer benchmarks in assessing UK mutual fund performance and performance persistence. *The European Journal of Finance*, *25*(12), 1077-1098.

Morris, S., Shim, I., & Shin, H. S. (2017). Redemption risk and cash hoarding by asset managers. *Journal of Monetary Economics*, *89*, 71-87.

Nanda, V., Narayanan, M. P., & Warther, V. A. (2000). *Journal of Financial Economics*, *57*(3), 417-443.

Otten, R., & Reijnders, M. (2012). *The performance of small cap mutual funds: Evidence for the UK*. Working Paper, Maastricht University.

Pástor, Ľ., & Stambaugh, R. F. (2003). Liquidity risk and expected stock returns. *Journal of Political economy*, *111*(3), 642-685.

Phalippou, L., & Massa, M. (2005, May). Mutual Funds and the Market for Liquidity. In *EFA 2005 Moscow Meetings Paper*.

Rao, K. C. N. (2020) A Study on Mutual Funds in India with respect to Perception of Indian Investor towards Investment in Mutual fund Market. *A Journal Of Composition Theory,* 1010-1015.

Silva Júnior, C. P., & Machado, M. A. (2020). Is commonality in liquidity a priced risk factor? *RAM. Revista de Administração Mackenzie*, *21*(2).

Stereńczak, S., Zaremba, A., & Umar, Z. (2020). Is there an illiquidity premium in frontier markets? *Emerging Markets Review*, *42*, 100673.

Wermers, R. (2000). Mutual fund performance: An empirical decomposition into stock-picking talent, style, transactions costs, and expenses. *The Journal of Finance*, *55*(4), 1655-1695.

Williams, J. B. (1938). *The theory of investment value* (No. HG4521 W48).

Xiong, J. X., Idzorek, T. M., & Ibbotson, R. G. (2014). Volatility versus tail risk: which one is compensated in equity funds? *The Journal of Portfolio Management*, *40*(2), 112-121.

Yan, X. S. (2008). Liquidity, investment style, and the relation between fund size and fund performance. *Journal of Financial and Quantitative Analysis*, *43*(3), 741-767.

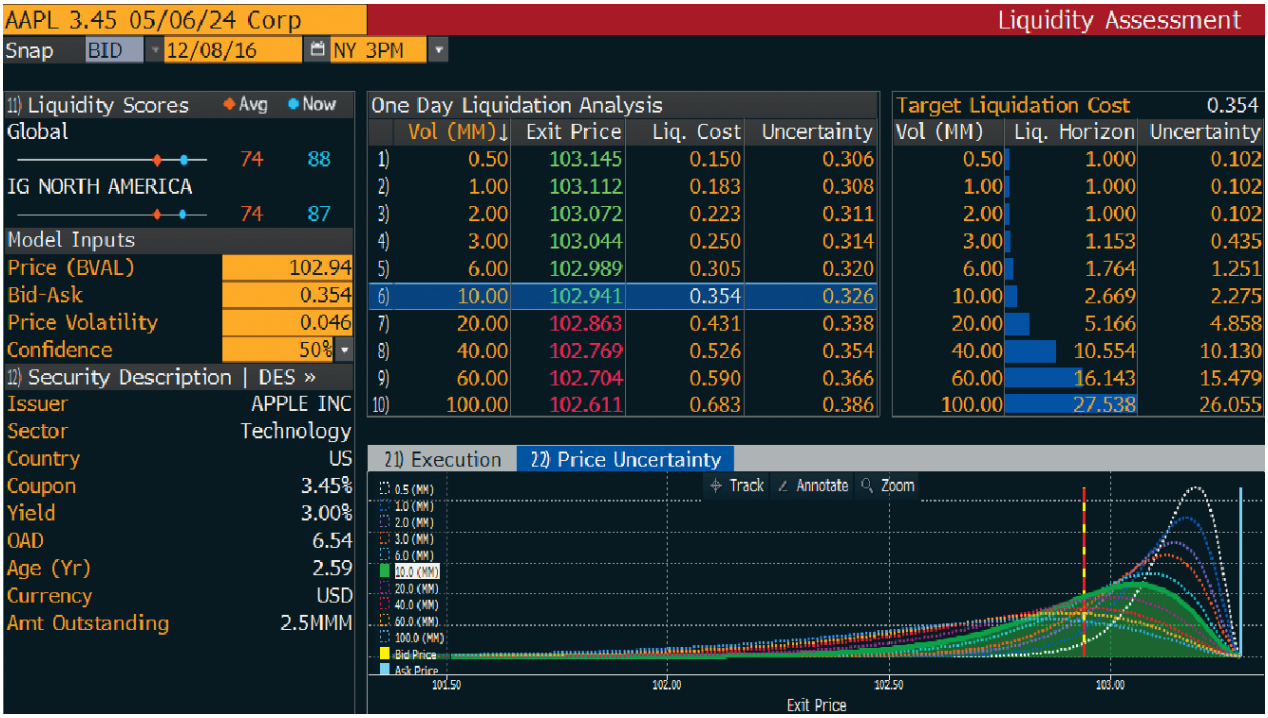
Yu, I. W., Fung, K. P., & Tam, C. S. (2010). Assessing financial market integration in Asia–equity markets. *Journal of Banking & Finance*, *34*(12), 2874-2885.

Zeng, Y. (2017). A dynamic theory of mutual fund runs and liquidity management. *Available at SSRN 2907718*.

Zhang, Z., Cai, J., & Cheung, Y. L. (2009). Explaining country and cross-border liquidity commonality in international equity markets. *Journal of Futures Markets: Futures, Options, and Other Derivative Products*, *29*(7), 630- 652.

Appendix A

Illustration of Bloomberg liquidity assessment for Apple Inc. Corporate Bond.



Source: Bloomberg L.P

Appendix B

Illustration of conventional and new approaches (with depth dimension) of generating funds' liquidity

A	X = Single asset portfolio with security A	Y = Single asset portfolio with security A
Market Price	$100 per share	$100 per share
Holding Volume	1000	10000
Market Value of Portfolio	100000	1000000
Weight of Security A	1.00	1.00
Liquidity Cost of Portfolio (conventional approach)	12.00 BPS	12.00 BPS
Liquidity Cost of Portfolio (with depth dimension)	12.00 BPS	25.00 BPS
B		
Total Return on Security A	$5 per share	$5 per share
Total Return of Portfolio	5%	5%
Liquidity Premium (Y - X)	0	0

Appendix C

Average Return of Fund Portfolios Sorted by Illiquidity Level

	Return			Cumulative Return		
Date	Average of three Illiquid Portfolios	Average of three liquid Portfolios	Illiquid - liquid	Average of three Illiquid Portfolios	Average of three liquid Portfolios	Illiquid - liquid
12/31/2019	0.47	1.14	-0.67	147.61	109.62	38.00
11/29/2019	1.10	0.89	0.21	147.15	108.48	38.67
10/31/2019	3.56	3.03	0.53	146.04	107.59	38.46
09/30/2019	5.21	5.29	-0.07	142.48	104.56	37.93
08/30/2019	-1.39	-1.75	0.36	137.27	99.27	38.00
07/31/2019	-6.54	-5.51	-1.02	138.66	101.02	37.64
06/28/2019	-1.11	-0.32	-0.79	145.19	106.53	38.66
05/31/2019	2.37	2.06	0.30	146.31	106.85	39.46
04/30/2019	-0.40	0.24	-0.64	143.94	104.79	39.15
03/29/2019	8.36	8.40	-0.04	144.34	104.54	39.80
02/28/2019	-0.68	-0.59	-0.09	135.98	96.14	39.84
01/31/2019	-2.53	-1.40	-1.13	136.66	96.73	39.93
12/31/2018	1.34	0.28	1.05	139.19	98.14	41.06
11/30/2018	3.09	6.18	-3.10	137.86	97.85	40.00
10/31/2018	-2.38	-4.52	2.14	134.77	91.67	43.10
09/28/2018	-9.24	-8.53	-0.71	137.15	96.19	40.96
08/31/2018	3.63	1.73	1.90	146.39	104.72	41.67
07/31/2018	4.73	5.39	-0.66	142.76	103.00	39.76
06/29/2018	-3.25	-1.83	-1.42	138.03	97.61	40.42
05/31/2018	-3.07	-1.27	-1.80	141.28	99.44	41.84
04/30/2018	5.66	4.94	0.72	144.35	100.71	43.64
03/30/2018	-3.90	-3.13	-0.76	138.69	95.77	42.92
02/28/2018	-4.08	-5.05	0.97	142.59	98.91	43.68
01/31/2018	-0.26	2.81	-3.08	146.67	103.96	42.71
12/29/2017	3.81	3.24	0.57	146.93	101.14	45.79
11/30/2017	1.73	-0.06	1.79	143.12	97.90	45.22
10/31/2017	6.28	5.67	0.61	141.39	97.96	43.43
09/29/2017	-0.16	-1.85	1.69	135.11	92.29	42.82
08/31/2017	-1.17	-0.84	-0.33	135.27	94.14	41.13
07/31/2017	4.55	5.98	-1.43	136.45	94.98	41.46
06/30/2017	0.40	-0.88	1.28	131.90	89.00	42.89
05/31/2017	0.23	1.94	-1.71	131.50	89.88	41.62
04/28/2017	3.58	3.09	0.49	131.27	87.94	43.33
03/31/2017	4.40	4.51	-0.11	127.69	84.85	42.83

02/28/2017	4.05	4.19	-0.15	123.29	80.34	42.94
01/31/2017	5.77	5.53	0.24	119.24	76.15	43.09
12/30/2016	-2.35	-1.15	-1.19	113.47	70.62	42.85
11/30/2016	-5.75	-6.00	0.25	115.82	71.78	44.04
10/31/2016	2.19	0.81	1.38	121.57	77.77	43.79
09/30/2016	-0.46	-1.15	0.69	119.38	76.96	42.42
08/31/2016	2.98	2.25	0.73	119.84	78.11	41.72
07/29/2016	5.19	5.22	-0.03	116.86	75.87	40.99
06/30/2016	4.83	2.12	2.70	111.67	70.64	41.03
05/31/2016	1.97	3.20	-1.23	106.84	68.52	38.32
04/29/2016	3.01	1.66	1.35	104.88	65.32	39.55
03/31/2016	11.20	11.91	-0.71	101.87	63.67	38.20
02/29/2016	-9.22	-8.15	-1.07	90.67	51.76	38.91
01/29/2016	-6.70	-6.04	-0.66	99.89	59.91	39.98
12/31/2015	0.15	0.09	0.06	106.59	65.95	40.64
11/30/2015	0.32	-1.54	1.86	106.44	65.86	40.59
10/30/2015	1.38	0.94	0.44	106.12	67.39	38.73
09/30/2015	-0.60	0.14	-0.74	104.74	66.45	38.29
08/31/2015	-5.67	-7.40	1.73	105.34	66.31	39.03
07/31/2015	4.92	2.87	2.04	111.01	73.71	37.30
06/30/2015	-0.93	-0.49	-0.44	106.09	70.84	35.26
05/29/2015	2.66	2.93	-0.27	107.03	71.33	35.70
04/30/2015	-2.65	-3.96	1.31	104.37	68.40	35.96
03/31/2015	-1.04	-3.06	2.02	107.02	72.36	34.65
02/27/2015	0.03	0.39	-0.37	108.06	75.43	32.63
01/30/2015	5.17	6.74	-1.57	108.03	75.03	33.00
12/31/2014	0.11	-2.46	2.58	102.86	68.29	34.57
11/28/2014	4.90	3.46	1.44	102.75	70.76	31.99
10/31/2014	4.43	4.82	-0.39	97.85	67.30	30.55
09/30/2014	2.54	0.31	2.23	93.41	62.48	30.93
08/29/2014	3.95	3.40	0.55	90.87	62.17	28.70
07/31/2014	-0.05	0.08	-0.13	86.93	58.78	28.15
06/30/2014	8.04	5.57	2.47	86.97	58.69	28.28
05/30/2014	13.06	10.25	2.81	78.93	53.13	25.81
04/30/2014	1.19	-0.14	1.34	65.87	42.87	23.00
03/31/2014	8.97	7.43	1.54	64.68	43.02	21.66
02/28/2014	3.33	3.62	-0.29	55.71	35.58	20.12
01/31/2014	-4.62	-3.97	-0.65	52.38	31.96	20.41
12/31/2013	4.58	2.90	1.68	57.00	35.94	21.06
11/29/2013	1.22	-1.37	2.59	52.42	33.03	19.38
10/31/2013	9.11	9.65	-0.54	51.20	34.40	16.79
09/30/2013	5.51	6.44	-0.93	42.09	24.75	17.34
08/30/2013	-4.24	-6.22	1.98	36.58	18.31	18.27

07/31/2013	-3.73	-1.85	-1.89	40.81	24.53	16.29
06/28/2013	-3.75	-3.80	0.05	44.55	26.37	18.17
05/31/2013	0.05	-0.76	0.82	48.30	30.18	18.12
04/30/2013	3.92	3.70	0.22	48.24	30.94	17.30
03/29/2013	-1.55	-0.59	-0.96	44.32	27.24	17.08
02/28/2013	-7.06	-6.09	-0.97	45.87	27.83	18.04
01/31/2013	-0.21	2.67	-2.88	52.93	33.92	19.01
12/31/2012	2.34	0.75	1.59	53.14	31.25	21.89
11/30/2012	4.93	4.45	0.48	50.80	30.50	20.30
10/31/2012	-0.13	-1.44	1.31	45.87	26.05	19.82
09/28/2012	8.67	9.70	-1.03	46.01	27.49	18.52
08/31/2012	0.40	0.54	-0.14	37.33	17.79	19.55
07/31/2012	0.15	-0.40	0.55	36.93	17.25	19.69
06/29/2012	5.30	6.89	-1.58	36.79	17.65	19.14
05/31/2012	-5.31	-7.00	1.69	31.48	10.76	20.72
04/30/2012	-0.21	-1.77	1.56	36.79	17.76	19.03
03/30/2012	-0.18	-2.12	1.94	37.00	19.53	17.48
02/29/2012	5.15	3.71	1.43	37.18	21.65	15.54
01/31/2012	11.76	12.24	-0.49	32.04	17.93	14.10
12/30/2011	-5.32	-4.81	-0.51	20.28	5.69	14.59
11/30/2011	-7.83	-9.23	1.41	25.60	10.50	15.10
10/31/2011	3.93	5.55	-1.62	33.43	19.73	13.69
09/30/2011	-1.06	-2.84	1.78	29.50	14.18	15.31
08/31/2011	-8.15	-8.30	0.15	30.56	17.02	13.54
07/29/2011	-0.07	-1.55	1.48	38.71	25.33	13.38
06/30/2011	0.86	1.63	-0.76	38.78	26.88	11.91
05/31/2011	-2.29	-2.95	0.66	37.92	25.25	12.67
04/29/2011	1.63	-0.33	1.95	40.21	28.20	12.01
03/31/2011	7.51	8.21	-0.70	38.58	28.53	10.06
02/28/2011	-4.85	-3.42	-1.43	31.08	20.32	10.76
01/31/2011	-9.72	-10.32	0.60	35.92	23.74	12.19
12/31/2010	1.93	3.51	-1.57	45.65	34.06	11.59
11/30/2010	-3.26	-3.74	0.48	43.71	30.55	13.16
10/29/2010	0.91	0.57	0.34	46.97	34.29	12.68
09/30/2010	7.66	9.38	-1.72	46.06	33.72	12.34
08/31/2010	2.14	1.22	0.92	38.40	24.34	14.06
07/30/2010	2.73	1.69	1.04	36.26	23.12	13.14
06/30/2010	4.97	4.20	0.77	33.53	21.43	12.10
05/31/2010	-3.40	-4.28	0.88	28.56	17.23	11.33
04/30/2010	3.34	2.20	1.14	31.96	21.51	10.45
03/31/2010	6.12	5.66	0.46	28.62	19.31	9.31
02/26/2010	-0.15	-0.06	-0.09	22.50	13.65	8.85
01/29/2010	-3.36	-4.06	0.70	22.65	13.71	8.94

12/31/2009	5.44	3.27	2.17	26.01	17.77	8.24
11/30/2009	6.49	5.81	0.69	20.57	14.50	6.07
10/30/2009	-3.70	-3.93	0.23	14.08	8.69	5.39
09/30/2009	7.55	7.13	0.42	17.78	12.62	5.16
08/31/2009	3.82	1.79	2.03	10.22	5.49	4.73
07/31/2009	8.29	6.70	1.60	6.41	3.70	2.70
06/30/2009	-1.00	-0.86	-0.14	-1.89	-2.99	1.11
05/29/2009	30.04	25.98	4.06	-0.89	-2.13	1.25
04/30/2009	13.40	11.20	2.20	-30.93	-28.11	-2.81
03/31/2009	6.66	5.95	0.71	-44.32	-39.31	-5.01
02/27/2009	-4.28	-4.27	-0.01	-50.98	-45.26	-5.72
01/30/2009	-5.55	-3.51	-2.04	-46.70	-40.99	-5.71
12/31/2008	8.36	6.76	1.60	-41.15	-37.48	-3.67
11/28/2008	-5.76	-3.58	-2.18	-49.51	-44.24	-5.27
10/31/2008	-23.08	-20.69	-2.39	-43.75	-40.66	-3.09
09/30/2008	-11.11	-10.68	-0.43	-20.67	-19.97	-0.70
08/29/2008	2.00	0.43	1.57	-9.56	-9.29	-0.27
07/31/2008	3.68	5.01	-1.32	-11.55	-9.72	-1.83
06/30/2008	-15.24	-14.73	-0.51	-15.24	-14.73	-0.51

Average Return of Stock Portfolios Sorted by Illiquidity Level

	Return			Cumulative Return		
Date	Average of three Illiquid Portfolios	Average of three liquid Portfolios	Illiquid - liquid	Average of three Illiquid Portfolios	Average of three liquid Portfolios	Illiquid - liquid
12/31/2019	1.32	-1.97	3.29	150.99	65.81	85.18
11/29/2019	-1.20	4.16	-5.36	149.67	67.78	81.89
10/31/2019	2.78	5.47	-2.69	150.88	63.62	87.25
09/30/2019	5.36	-0.52	5.88	148.10	58.16	89.94
08/30/2019	-0.54	-5.98	5.45	142.74	58.68	84.07
07/31/2019	-6.75	-8.13	1.39	143.28	64.66	78.62
06/28/2019	-0.87	-3.95	3.08	150.03	72.79	77.23
05/31/2019	1.49	-1.44	2.92	150.90	76.74	74.16
04/30/2019	0.15	-4.18	4.33	149.41	78.18	71.23
03/29/2019	6.71	11.93	-5.23	149.26	82.36	66.90
02/28/2019	1.02	-1.67	2.69	142.55	70.43	72.13
01/31/2019	-3.17	-5.31	2.14	141.53	72.10	69.43
12/31/2018	2.66	3.84	-1.18	144.70	77.41	67.30
11/30/2018	1.55	1.16	0.39	142.04	73.57	68.48
10/31/2018	-3.88	3.80	-4.67	140.50	72.41	68.09
09/28/2018	-9.07	-13.90	4.83	144.38	68.61	75.77

08/31/2018	3.50	5.82	-2.32	153.45	82.51	70.94
07/31/2018	2.93	4.64	-1.93	149.95	76.69	73.26
06/29/2018	-3.42	-4.66	1.24	147.03	72.05	74.97
05/31/2018	-3.04	-6.27	3.24	150.45	76.72	73.73
04/30/2018	4.46	6.45	-1.99	153.48	82.99	70.49
03/30/2018	-3.40	-6.76	3.36	149.02	76.54	72.48
02/28/2018	-1.64	-5.64	4.00	152.42	83.30	69.12
01/31/2018	-2.81	-0.93	-1.88	154.06	88.95	65.12
12/29/2017	5.24	7.58	-2.35	156.87	89.87	67.00
11/30/2017	4.31	-0.98	5.29	151.63	82.29	69.34
10/31/2017	4.70	7.83	-3.13	147.32	83.27	64.05
09/29/2017	1.14	-2.93	4.07	142.62	75.44	67.19
08/31/2017	-2.10	-3.35	1.26	141.49	78.37	63.12
07/31/2017	1.27	6.21	-4.94	143.58	81.72	61.86
06/30/2017	1.15	2.41	-1.26	142.31	75.51	66.80
05/31/2017	-0.64	-4.37	3.72	141.17	73.10	68.07
04/28/2017	2.67	5.49	-2.82	141.81	77.47	64.34
03/31/2017	7.86	1.31	4.51	139.14	71.97	67.16
02/28/2017	2.94	7.11	-3.17	131.28	70.66	60.62
01/31/2017	2.61	5.53	-2.92	128.34	63.55	64.79
12/30/2016	-1.17	-2.50	1.33	125.72	58.02	67.71
11/30/2016	-6.96	-6.82	-0.14	126.89	60.52	66.38
10/31/2016	3.13	3.42	-0.29	133.85	67.34	66.52
09/30/2016	1.84	-1.90	3.74	130.73	63.92	66.81
08/31/2016	1.92	1.96	-0.04	128.89	65.82	63.07
07/29/2016	3.95	5.35	-1.40	126.97	63.86	63.11
06/30/2016	3.73	6.15	-2.42	123.03	58.51	64.51
05/31/2016	1.42	0.67	0.75	119.29	52.36	66.93
04/29/2016	3.50	5.27	-1.76	117.88	51.70	66.18
03/31/2016	9.02	13.05	-4.03	114.37	46.43	67.94
02/29/2016	-8.51	-11.11	2.60	105.35	33.38	71.97
01/29/2016	-7.90	-10.53	2.64	113.86	44.49	69.37
12/31/2015	2.07	0.57	1.50	121.76	55.02	66.73
11/30/2015	-0.94	0.44	-1.38	119.69	54.45	65.24
10/30/2015	1.81	4.07	-2.26	120.63	54.01	66.62
09/30/2015	1.50	2.57	-1.07	118.82	49.94	68.88
08/31/2015	-4.16	-9.11	4.96	117.32	47.37	69.95
07/31/2015	2.55	2.91	-0.36	121.48	56.48	65.00
06/30/2015	-1.29	-5.47	4.18	118.93	53.57	65.36
05/29/2015	0.93	-1.42	2.35	120.22	59.04	61.18
04/30/2015	-2.49	-2.96	0.47	119.29	60.46	58.83
03/31/2015	0.27	-5.57	4.84	121.78	63.42	58.36
02/27/2015	0.69	1.12	-0.43	121.51	68.99	52.51

01/30/2015	2.48	4.62	-2.15	120.81	67.87	52.94
12/31/2014	4.70	-3.74	5.23	118.34	63.25	55.09
11/28/2014	4.22	1.79	2.43	113.63	66.98	46.65
10/31/2014	2.79	5.50	-2.72	109.41	65.19	44.22
09/30/2014	3.53	-0.85	4.37	106.62	59.69	46.94
08/29/2014	2.53	-0.69	3.22	103.09	60.53	42.56
07/31/2014	1.46	-3.90	5.36	100.56	61.22	39.34
06/30/2014	7.59	9.97	-2.38	99.10	65.12	33.98
05/30/2014	9.46	14.61	-5.15	91.51	55.15	36.36
04/30/2014	6.15	1.15	3.15	82.05	40.54	41.51
03/31/2014	7.82	14.42	-6.61	75.90	39.39	36.50
02/28/2014	5.57	2.12	3.45	68.08	24.97	43.11
01/31/2014	-6.60	-9.11	2.51	62.51	22.85	39.66
12/31/2013	5.87	5.01	0.86	69.11	31.96	37.15
11/29/2013	6.43	2.49	3.94	63.24	26.96	36.29
10/31/2013	4.29	7.77	-3.48	56.81	24.47	32.34
09/30/2013	7.02	8.09	-1.06	52.53	16.70	35.83
08/30/2013	-3.25	-5.70	2.45	45.50	8.61	36.89
07/31/2013	-3.70	-5.53	1.84	48.76	14.31	34.44
06/28/2013	-3.68	-6.91	3.24	52.45	19.85	32.61
05/31/2013	4.56	-0.95	5.51	56.13	26.76	29.37
04/30/2013	1.42	5.84	-4.41	51.57	27.71	23.85
03/29/2013	-3.80	-4.14	0.34	50.14	21.88	28.27
02/28/2013	-6.17	-10.06	3.90	53.94	26.02	27.92
01/31/2013	-2.84	-0.47	-2.37	60.11	36.08	24.03
12/31/2012	3.41	2.70	0.71	62.95	36.55	26.40
11/30/2012	3.46	9.26	-5.80	59.54	33.85	25.69
10/31/2012	-0.89	-4.51	3.62	56.08	24.59	31.49
09/28/2012	6.07	13.99	-7.91	56.97	29.11	27.87
08/31/2012	1.96	-2.13	4.09	50.90	15.12	35.78
07/31/2012	-0.36	-2.75	2.39	48.94	17.25	31.69
06/29/2012	2.02	4.06	-2.03	49.30	20.00	29.30
05/31/2012	-3.47	-8.06	4.58	47.27	15.94	31.33
04/30/2012	1.66	-4.27	3.93	50.74	24.00	26.75
03/30/2012	-0.14	-4.19	3.05	49.08	28.26	20.82
02/29/2012	6.32	8.46	-2.14	49.22	32.45	16.76
01/31/2012	9.81	11.66	-1.85	42.90	23.99	18.91
12/30/2011	-6.03	-9.26	3.23	33.08	12.33	20.76
11/30/2011	-8.53	-10.83	2.29	39.11	21.59	17.52
10/31/2011	-0.09	5.57	-5.66	47.65	32.42	15.23
09/30/2011	-0.02	-1.67	1.66	47.74	26.85	20.89
08/31/2011	-6.61	-9.78	3.17	47.75	28.52	19.23
07/29/2011	1.98	-0.34	2.31	54.36	38.30	16.06

06/30/2011	-0.37	-2.08	1.70	52.38	38.63	13.75
05/31/2011	-3.73	-3.37	-0.37	52.75	40.71	12.04
04/29/2011	5.28	2.42	2.88	56.49	44.08	12.41
03/31/2011	8.24	10.79	-2.54	51.21	41.65	9.56
02/28/2011	-3.09	-7.19	3.09	42.97	30.86	12.10
01/31/2011	-10.24	-10.23	-0.01	46.06	38.05	8.01
12/31/2010	2.57	0.65	1.93	56.30	48.28	8.02
11/30/2010	-5.66	-7.24	1.58	53.73	47.63	6.09
10/29/2010	1.37	4.46	-3.09	59.39	54.87	4.52
09/30/2010	6.74	10.44	-3.70	58.01	50.41	7.61
08/31/2010	2.02	0.76	1.26	51.27	39.97	11.30
07/30/2010	2.42	3.17	-0.75	49.25	39.21	10.04
06/30/2010	5.61	6.76	-1.16	46.83	36.04	10.79
05/31/2010	-3.94	-6.04	2.10	41.23	29.28	11.95
04/30/2010	5.09	3.79	1.30	45.16	35.32	9.85
03/31/2010	6.06	4.52	1.54	40.07	31.53	8.54
02/26/2010	1.58	-2.25	3.83	34.01	27.00	7.00
01/29/2010	-1.52	-3.69	2.16	32.42	29.26	3.17
12/31/2009	6.74	4.50	2.24	33.95	32.94	1.00
11/30/2009	8.78	10.63	-1.86	27.21	28.44	-1.24
10/30/2009	-3.56	-5.63	2.07	18.43	17.81	0.62
09/30/2009	8.33	5.36	2.97	21.99	23.44	-1.45
08/31/2009	5.21	4.01	1.20	13.66	18.08	-4.42
07/31/2009	11.28	8.00	3.28	8.45	14.07	-5.62
06/30/2009	0.55	-2.24	2.79	-2.83	6.07	-8.90
05/29/2009	27.74	29.64	-1.89	-3.38	8.32	-11.69
04/30/2009	14.65	18.21	-3.55	-31.12	-21.32	-9.80
03/31/2009	7.97	12.31	-4.34	-45.77	-39.53	-6.25
02/27/2009	-3.67	-5.59	1.91	-53.74	-51.84	-1.90
01/30/2009	-9.42	-5.55	-3.86	-50.07	-46.25	-3.82
12/31/2008	8.44	11.66	-3.21	-40.65	-40.70	0.05
11/28/2008	-9.51	-7.15	-2.35	-49.10	-52.36	3.26
10/31/2008	-19.99	-25.08	5.08	-39.59	-45.21	5.62
09/30/2008	-12.83	-12.86	0.03	-19.59	-20.13	0.54
08/29/2008	2.48	1.88	0.60	-6.76	-7.27	0.51
07/31/2008	2.13	5.22	-3.08	-9.24	-9.15	-0.09
06/30/2008	-11.37	-14.37	2.99	-11.37	-14.37	2.99