Anshi Goel*
Vanita Tripathi**
Megha Agarwal***

SEASONAL BEHAVIOR OF LIQUIDITY PREMIUM IN INDIAN STOCK MARKET

ABSTRACT: This study empirically investigates the seasonal behavior of liquidity premium in Indian stock market with the sample of BSE 500 stocks and Nifty 500 stocks representing Bombay Stock Exchange and National Stock Exchange respectively for a brief period from 1st April 2000 to 31st March 2017. We have employed four different proxies of liquidity - Trading volume, Turnover rate, Relative Spread & Amihud Illiquidity Ratio to strengthen the results. To capture seasonality on liquidity premium, we decompose the alpha and slope coefficients by using the dual beta model (Bhardwaj and Brooks, 1993) constructed by incorporating a dummy variable in the standard CAPM and liquidity augmented CAPM. The evidence suggests strong seasonal component in liquidity premium at both the exchanges such as (i) January Effect – the liquidity premium is reliably positive during non-January months whereas January generates negative or very low premium. (ii) April Effect – the month of April generates significantly higher liquidity premium relative to non-April months. It has strong inference for investors and portfolio managers who all are on the lookout for investment strategies that can lend a hand to beat the market.

Keywords: Liquidity Premium, Seasonality, January Effect, April Effect, Indian Stock Market
JEL Codes: C01, C10, C33, G3, H72

INTRODUCTION

"*Investors prefer to commit capital to liquid investments, which can be*

* PhD. Research Scholar, Department of Commerce, Delhi School of Economics, University of Delhi; e-mail id: anshigoel48@gmail.com
**Professor, Department of Commerce, Delhi School of Economics, University of Delhi; e-mail id: vanitatripathi1@yahoo.co.in
***Assistant Professor, Rajdhani College, University of Delhi; e-mail id: megha_dse@yahoo.co.in

traded quickly and at low cost whenever the need arises. Investments with less liquidity must offer higher expected returns to attract investors. In equilibrium, the expected returns on capital assets are increasing functions of both risk and illiquidity." (Amihud & Mendelson, 1991)

Liquidity is the market's ability to handle large orders from traders swiftly with least transaction cost and minimal influence on prices. If markets are fully efficient, then assets would be perfectly liquid where any amount of trade orders can be executed without influencing prices. But in reality, markets are not fully efficient due to the existence of market imperfections that lead to illiquidity. Amihud, Mendelson & Pedersen (2005) identified five market imperfections that drive the variations in stock liquidity–exogenous transaction costs, demand pressure, inventory risk, asymmetric information and search frictions. These market imperfections make trading expensive for traders eventually affecting stock prices. The risk of holding less liquid or illiquid securities that cannot be traded with ease at the prevailing prices in the market is known as liquidity risk. Investors face liquidity risk at the time of transfer of ownership of their assets, thus they should regard it as a significant element while evaluating their investment opportunities. Liquidity varies over time as well as across stocks, therefore risk-averse investors command superior returns for being exposed to liquidity risk.

The influential research of Amihud & Mendelson (1986) proposed that liquidity is a significant factor in the pricing of assets as the expected stock return increases with a drop in the level of liquidity as calculated by the bid-ask spread. Since then many studies like Amihud & Mendelson (1989), Brennan & Subrahmanyam (1996), Datar et al. (1998), Amihud (2002) and Liu (2006) all elaborate upon the role of liquidity as a determinant of equity returns and evidence the existence of liquidity premium in securities market by showing that investors command superior return for investing in illiquid stocks with high transaction cost. Eleswarapu & Reinganum (1993) pointed out on the seasonal behaviour of liquidity premium at NYSE and observed liquidity premium to be significantly positive only in January and does not exist otherwise. Hence, it is important to verify the realism of seasonal behaviour of liquidity premium at two premier stock exchanges of India i.e. BSE and NSE. In the Indian context, we should check the seasonality of liquidity premium through two probable ways: (i) January effect (because of the growing integration of Indian market around the globe) and (ii) April effect (equivalent to US market January effect).

LITERATURE REVIEW

The most influential work on this front owes to Amihud & Mendelson (1986), who theoretically modelled a marketplace where investors were

rational with diverse holding periods and assets having distinctive relative spread. The resulting market features were: (a) market average return goes up with spread, (b) expected stock returns increases with spread, (c) High spread stocks are preferred by investors with longer holding periods (clientele effect) & (d) stock return and spread relationship to be concave. They empirically examined the association between expected stock return and bid-ask spread for NYSE stocks over a period of 1961-1980 and found that stock return was a rising and concave function of the spread. Hence, liquidity is a significant factor in asset pricing and investors require compensation for the cost of illiquidity.

Following that paper, many studies have empirically investigated liquidity & stock return relationship using various proxies of liquidity such as bid-ask spread, turnover rate, trading volume, Amihud illiquidity ratio (daily price response associated with one dollar of trading volume) and others. Amihud & Mendelson (1989), Brennan & Subrahmanyam (1996), Eleswarapu (1997), Datar, Naik & Radcliffe (1998), Chalmers & Kadlec (1998), Chordia, Subrahmanyam & Anshuman (2001), Amihud (2002), Pastor & Stambaugh (2003), Liu (2006), Nguyen, Mishra & Ghosh (2007), Korajczyk & Sadka (2008), Hasbrouck (2009), Asparouhova, Bessembinder & Kalcheva (2010), Baradarannia & Peat (2013) and Kim & Na (2018) all examined the effect of liquidity on the pricing of securities in the U.S. equity market for NYSE, AMEX & NASDAQ stocks. Nevertheless, most of these papers support Amihud and Mendelson's (1986) finding. While most of the studies in the literature have been conducted for the U.S. market, but few studies do exist for other emerging markets like Marshall & Young (2003) examined Australian stock market; Wang & Cheng (2004), Wang & Kong (2010), Narayan & Zheng (2011) studied Shenzhen and Shanghai Stock Exchanges of the Chinese Stock Market; Chang, Faff & Hwang (2010) studied Tokyo Stock Exchange; Li, Sun & Wang (2011) examined Japanese Stock Market; Florackis, Gregoriou & Kostakis (2011) explored London Stock Exchange; Lam & Tam (2011) examined Hong Kong Stock Exchange and Hoang & Phan (2019) pursued Ho Chi Minh Stock Exchange in Vietnam market. Also, Bekaert, Harvey & Lundblad (2007) studied 19 emerging markets including India; Amihud et. al. (2015) scrutinized 45 countries around the world including 19 emerging & 26 developed markets and Chiang & Zheng (2015) explored the G7 countries. All these studies elaborate on the concerned issue in different markets across the globe and evidence that liquidity is a significant factor in the pricing of securities. As evidenced by the foregoing scrutiny, most of the studies have been performed on the U.S. market with only some studies on other emerging markets but none for the Indian market in isolation.

However, the literature has severely neglected the issue with respect to the seasonality of liquidity premium in the equity market. Eleswarapu &

Reinganum (1993) examined the seasonal behaviour of liquidity premium in the pricing of securities at NYSE by employing relative bid-ask spread to measure liquidity. A strong seasonal component was evidenced, where liquidity premium was substantially positive only in January and couldn't detect any affirmative liquidity premium for other than January months. Hence, in the absence of much literature on seasonality of liquidity premium, this research is substantial to fill a hole by studying the seasonal behavior of liquidity premium in the Indian stock market.

RESEARCH METHODOLOGY

Data: The sample consists of S&P BSE 500 stocks and Nifty 500 stocks to represent BSE and NSE respectively. They fairly represent the markets as both the indices have a broad spectrum of stocks belonging to 20 major industries of the economy and accounts for more than 90% market capitalisation of the exchanges. Also, the data is easily available for these companies than for the other companies that are not a part of these groups. The sample period ranges from 1st April 2000 to 31st March 2017, not including data before 2000 essentially because of the major developments in the market structure of Indian stock market during that period and data before this period is sparsely available. The record is mainly gathered from the CMIE Prowess and Thomson Reuters databases and official websites of BSE, NSE and RBI, all of these are renowned sources for providing accurate and complete historical data. The dataset includes:

- Monthly closing adjusted share prices of BSE and NSE sample stocks have been utilised to estimate the stock returns. The monthly stock returns are computed using the equation:

$$R_{i,t} = \frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}}$$

  where,
  $R_{i,t}$ is the return on stock i in the month t
  $P_{i,t}$ is the closing adjusted share price of stock i in month t
  $P_{i,t-1}$ is the closing adjusted share price of stock i in month $t-1$.

- Monthly closing index values have been used to calculate monthly return on market portfolio (indices S&P BSE 500 & Nifty 500 are taken as proxies of the exchanges).
- The cut-off implicit yield on 91 days Treasury Bills considered as a risk-free return (RBI website).
- To compute different liquidity proxies for the sample stocks of BSE and NSE, two frequencies of data have been used that includes:

1. Daily Data: Bid price, ask price, mid-price, closing price, volume-weighted average price, trading volume (no. of shares traded).
2. Monthly Data: Volume-weighted average price, trading volume (no. of shares traded) and the number of outstanding shares.

It is important to specify that complete data set was not available for all the 500 sample companies of both BSE and NSE all through the sample span of 17 years, therefore the effectual number of stocks employed in the study varies from 265 to 490 over the period.

Construction of Liquidity Proxies: According to Liu (2006), "liquidity can be best described as the ability to trade large quantities quickly at low cost with little impact on price". Liquidity is a multidimensional concept, so we employ several liquidity proxies from the literature to capture different aspects of liquidity based on data availability. Many measures of liquidity have been proposed but none of them has been put superior to others. To study the effect of liquidity at BSE and NSE, the present study comprehensively employs four liquidity measures:

1. *Trading Volume:* Brennan & Subrahmanyam (1995) identified trading volume as a significant measure of liquidity. For a particular stock, it is directly related to liquidity as a large volume of trading signifies higher liquidity. For each stock, the monthly trading volume is computed as the value of shares traded over a month.

$$\text{Rupees Trading Volume}_t^i = V_{i,t} * P_{i,t}$$

where,
$V_{i,t}$ is trading volume (no. of shares traded) for stock i in month t
$P_{i,t}$ is volume weighted average price for stock i in month t

2. *Turnover Rate:* It is another important measure of liquidity capturing trading frequency calculated as a proportion of number of shares traded to shares outstanding during a particular month. For a stock, the turnover rate is positively related to liquidity implying greater the turnover rate, better the liquidity of an asset.

$$Turnover\ Rate_t^i = \frac{V_{i,t}}{Shares_{i,t}}$$

where,
$V_{i,t}$ is the total trading volume (no. of shares traded) for stock i in month t
$Shares_{i,t}$ is the number of shares outstanding for stock i in month t

3. *Relative (Quoted) Spread:* Amihud & Mendelson (1986) put forward a direct measure of transaction cost defined as the ask price minus the bid price, divided by the mid prices. It gauges illiquidity implying that stocks with higher spread have lesser liquidity (illiquid). Daily relative/quoted spread for each stock is computed with the formula:

$$\text{Quoted Spread}_d^i = \frac{P_{i,d}^A - P_{i,d}^B}{(P_{i,d}^A + P_{i,d}^B)/2}$$

where,
$P_{i,d}^A$ is the ask price for stock i on day d
$P_{i,d}^B$ is the buy price for stock i on day d

4. *Amihud Illiquidity (ILLIQ) Ratio:* Amihud (2002) defined this price impact measure of liquidity as – "daily price response associated with one dollar of trading volume". The core idea of ILLIQ ratio was that illiquid stocks have a lower capacity to absorb larges trades – implying that stocks with high ILLIQ ratio are less liquid. Illiq ratio is computed as:

$$ILLIQ_t^i = \frac{1}{D_t^i} \sum_{d=1}^{D_t^i} \frac{|R_{td}^i|}{V_{td}^i}$$

where,
$|R_{td}^i|$ is the absolute return of stock i in day d of month t
V_{td}^i is the trading volume (in million rupees)for the stock I on day d of month t
D_t^i is the total trading days for stock i in month t

Construction of Liquidity-Sorted Portfolios: Decile portfolios are created for all the liquidity proxies separately for each year throughout the sample span for the sample stocks of BSE and NSE. To begin with, decile portfolios were created on the basis of trading volume for each year all through the sample period. Every year June end, we sort the stocks in descending order based on the average trading volume in the previous year (in order of liquidity from most to least liquid). After that, the sorted securities were divided into decile portfolios (P1 to P10) and then for next twelve month (July of Y_t to June of Y_{t+1}) equally-weighted monthly returns are estimated for these portfolios. Then, the excess portfolio return is computed by deducting the risk-free rate from the portfolio returns. P1 (liquid portfolio) includes 10% of the most liquid stocks, while P10 (illiquid portfolio) comprises 10% of the least liquid stocks. A portfolio P10-P1 is also constructed to assess the economic feasibility of liquidity-based trading

strategy (buying P10 & short selling P1). Portfolios were continuously rebalanced all through the sample span in June end every year. This strategy is known as 12/12 strategy i.e. 12 months portfolio formation & 12 months portfolios holding period. For inclusion of a stock in portfolio formation process, it must be traded during the year. Similarly, liquidity-sorted decile portfolios were created for other three liquidity proxies' viz. turnover, relative spread and ILLIQ ratio. However, for the formation of liquidity portfolios for the relative spread and ILLIQ ratio (being direct measures of illiquidity) stocks were sorted in ascending order.

Notes:

- Portfolio formation starts from June, 2000 and continues throughout the sample period for all the proxies of liquidity.
- It is important to mention that financial year in India is from 1st April to 31st March every year, but the formation of portfolios is performed in each year June end with the assumption that financial data is available to investors at the time of investment decision to evade look ahead-bias.

Construction of Risk Factors: The following risk factors are used in regression models employed in this study:

Market Factor: Market Risk Premium ($R_{M_t} - R_{f_t}$) calculated by subtracting risk-free return (cut-off implicit yield on 91 days Treasury Bills) from the monthly return on the market portfolio - S&P BSE 500 & Nifty 500 indices are taken as the proxies of market portfolios of BSE & NSE respectively.

Liquidity Factor: IMV_t is estimated for each of the liquidity measures: trading volume, turnover, quoted spread & ILLIQ ratio separately. In June end each year, we sort the sample stocks into three liquidity portfolios (Very Liquid (V), Moderately Liquid (N) & Illiquid (I)) on a 30:40:30 divide using each liquidity measure independently. Then for the next twelve months (July of Y_t to June of Y_{t+1}), equally-weighted average monthly returns are computed for these three portfolios. Portfolios are rebalanced each year and it continues all through the sample period. Liquidity Factor (IMV_t) is the excess return on the portfolio of illiquid stocks (I) over very liquid stocks (V).

Risk-Adjusted Measures of Performance Evaluation: Following risk-adjusted ratios are calculated for the liquidity portfolios to assess their investment appraisal.

1. *Sharpe Ratio:* It measures the relationship between the average excess portfolio return ($R_P - R_f$) and the total risk of the portfolio. It does not presume well-diversified portfolios, so it employs standard deviation to measure of risk.

$$\text{Sharpe Ratio} = \frac{R_P - R_f}{\sigma_P}$$

where,
R_P is return of portfolio,
R_f is risk − free rate &
σ_P is standard deviation of portfolio.

2. *Treynor Ratio:* This ratio measures the relationship between the portfolio return over the risk-free rate with its systematic risk indicated by portfolio beta (β_P). As it accounts only systematic risk, it is mostly suitable for assessing the performance of diversified portfolios.

$$\text{Treynor Ratio} = \frac{R_P - R_f}{\beta_P}$$

where
R_P is the return of portfolio,
R_f is risk − free rate &
β_P is portfolio's beta (systematic risk).

3. *Information Ratio:* It is estimated as the residual return of the portfolio divided by tracking error. Residual return = portfolio return minus benchmark index return & tracking error is residual return standard deviation.

$$\text{Information Ratio} = \frac{E[R_P - R_B]}{\sqrt{var[R_P - R_B]}}$$

where, R_P is return of portfolio & R_B is index or benchmark return.

Regression Models: The well-documented models considered in this study are the Standard CAPM model of Sharpe (1964) & Lintner (1965) and Liquidity augmented CAPM Model to identify the existence of liquidity premium in India stock market.

Standard CAPM

$$R_{P_t} - R_{f_t} = \propto + \beta_M \left(R_{M_t} - R_{f_t}\right) + \varepsilon_t$$

Liquidity Augmented Standard CAPM

$$R_{P_t} - R_{f_t} = \propto + \beta_M \left(R_{M_t} - R_{f_t}\right) + \beta_{IMV}(IMV_t) + \varepsilon_t$$

where,
$R_{P_t} - R_{f_t}$ is portfolio excess return,
$\propto$ is the intercept,

$R_{M_t} - R_{f_t}$ is market excess return,
IMV_t is liquidity risk factors,
β_M & β_{IMV} are the slope coefficient for market and liquidity risk factors respectively &
ε_t is a residual term.

Effect of Seasonality: Eleswarapu & Reinganum (1993) examined the seasonal behaviour of liquidity premium at NYSE, where liquidity premium was observed only in January and does not exist otherwise. Therefore, it is essential to verify the realism of seasonal behaviour of liquidity at BSE and NSE. In the Indian context, we can check the seasonality through two probable ways: (i) January effect (because of the growing integration of Indian market around the globe) and (ii) April effect (equivalent to US market January effect).

First, we evaluate the performance of liquidity-sorted portfolios for January & Non-January months and April & non-April months by using performance evaluation measures. Further, to capture the January effect on liquidity premium at BSE and NSE, we decompose the alpha and slope coefficients for January & Non-January months using dual beta model (Bhardwaj and Brooks, 1993) constructed by incorporating a dummy variable (D_J) in standard CAPM and liquidity augmented CAPM. Similarly, to capture the April effect on liquidity premium at BSE and NSE, we decompose the alpha and slope coefficients for April and Non-April months by employing dual beta model constructed by incorporating a dummy variable (D_A) in standard CAPM and liquidity augmented CAPM.

- **January Effect**

Dummy variable (D_J) is formed by allotting 0 for non-January & 1 for January month. Following modified dual beta version of the factor models are estimated to capture the seasonality with respect to January effect.

Dummy Variable Regression

To isolate the liquidity effect in January & non-January months, the following dummy variable regression models are estimated for the liquidity-sorted decile portfolios:

$$R_P - R_f = \alpha_0 + D_J\alpha_1 + \beta_0\left(R_M - R_f\right) + \beta_1 D_J.\left(R_M - R_f\right) + \varepsilon_t$$
$$R_P - R_f = \alpha_0 + \alpha_1 D_J + \beta_0\left(R_M - R_f\right) + \beta_1 D_J.\left(R_M - R_f\right) + \beta_2 IMV + \beta_3 D_J.IMV + \varepsilon_t$$

where,
$R_P - R_f$ is portfolio excess return,
$\propto$ is the intercept,

$R_M - R_f$ is the market excess return,
IMV is the liquiidty factor,
ε_t is a residual term &
β_M & β_{IMV} are the slope coefficients for market and liquidity risk factors respectively.
D_J (Dummy Variable) = 0 for Non-January & 1 for January Month
α_0 = Intercept for Non-January Month
$\alpha_0 + \alpha_1$ = Intercept for January Month
β_0 = Slope of Market Risk for Non-January Month
$\beta_0 + \beta_1$ = Slope of Market Risk for January Month
β_2 = Slope of Liquidity Effect for Non-January Month
$\beta_2 + \beta_3$ = Slope of Liquidity Effect for January Month

- **April Effect**

Dummy variable (D_A) is formed by allotting 0 for the non-April months and 1 for the April. Following modified dual beta version of the factor models are estimated to capture the seasonality on account of April effect.

Dummy Variable Regression

To isolate liquidity effect in the April & non-April months, the following dummy variable regression models are estimated for the liquidity-sorted decile portfolios:

$$R_P - R_f = \alpha_0 + D_A\alpha_1 + \beta_0(R_M - R_f) + \beta_1 D_A.(R_M - R_f) + \varepsilon_t$$
$$R_P - R_f = \alpha_0 + \alpha_1 D_A + \beta_0(R_M - R_f) + \beta_1 D_A.(R_M - R_f) + \beta_2 IMV + \beta_3 D_A.IMV + \varepsilon_t$$

where,
$R_P - R_f$ is portfolio excess return,
$\propto$ is the intercept,
$R_M - R_f$ is market excess return,
IMV is the liquidity factor,
ε_t is a residual (random error) term &
β_M & β_{IMV} are the slope coefficients for market and liquidity risk factors respectively.
D_A (Dummy Variable) = 0 for Non-April & 1 for April Month
α_0 = Intercept for Non-April Month
$\alpha_0 + \alpha_1$ = Intercept for April Month
β_0 = Slope of Market Risk for Non-April Month
$\beta_0 + \beta_1$ = Slope of Market Risk for April Month
β_2 = Slope of Liquidity Effect for Non-April Month
$\beta_2 + \beta_3$ = Slope of Liquidity Effect for April Month

EMPIRICAL RESULTS

The results of liquid stocks portfolios (P1 & P2), illiquid stocks portfolios (P9 & P10) and liquidity-based investment strategy (P10-P1) are reported in the tables.

Performance evaluation of liquidity portfolios of BSE and NSE stocks is reported in table 1. As a first confirmatory indication of liquidity risk being a significant factor affecting stock returns, it is noticed that the portfolios across all four liquidity proxies show an increasing trend in mean monthly excess return as we go from first portfolio P1 (liquid stocks) to last P10 (illiquid stocks). It is to be noted that the average return of illiquid stocks portfolio (P10) is much higher than liquid stocks portfolio (P1). Illiquid stocks portfolio (P10) provides a superior return that is about two to three times of liquid stocks portfolio (P1). Long short liquidity-based trading strategy may be adopted by investors by going long on P10 and short on P1 to earn liquidity premium. A strong liquidity effect is observed such that when liquidity of portfolio decline, the average excess portfolio returns increases almost monotonically indicating that high risk related to illiquid stocks generates higher returns. This implies the relationship liquidity and stock returns to be negative.

In harmony with the theory of finance, where risk return go together in tandem, high risk in less liquid stocks portfolio generates a high Sharpe ratio. Sharpe ratio of portfolios increases monotonically from P1 to P10 signifying that as risk increases due to a drop in the level of liquidity, returns also increases. Sharpe ratio of P10 (Illiquid stocks portfolio) is about three to four times that of P1 (liquid stocks portfolio). Similarly, Treynor ratio and information ratio also increases almost monotonically from P1 to P10 for all the proxies of liquidity indicating investors are rewarded with superior returns for holding a risky portfolio of less liquid stocks. This validates the presence of a strong liquidity effect as liquidity risk in portfolio increases, returns also expand to recompense investors to put up for holding lesser liquid stocks.

The return performance of portfolios sorted on different liquidity measures is consistent with the risk-return trade off such that illiquid stocks portfolio (P10) provides higher returns than liquid stocks portfolio (P1). Mere confirmation of liquidity premium may not be exciting for the investors who look for abnormal profits. A more essential concern is to confirm the presence of observed liquidity premium through capital asset pricing framework.

Tables 2 presents the regression results of CAPM for liquidity-sorted portfolios derived from different liquidity proxies. Intercept value (α – a measure of abnormal returns) increases monotonically as we move from

liquid to illiquid stocks portfolio (i.e. P1 to P10) which indicates that as liquidity risk widens return also increases to compensate investors for holding illiquid stocks in their portfolios. This implies the existence of a negative or inverse relationship between liquidity and stock returns as abnormal return generated by portfolio increases with a decline in its liquidity level. These results verify the presence of strong liquidity premium in Indian stock market both at BSE and NSE such that illiquid stocks outperform liquid stocks. Mostly, the market beta "β_m" is greater than one and highly significant across portfolios. Market beta decreases as one move from liquid to illiquid stocks portfolio (P1 to P10) indicating that liquid stocks are more sensitive to market risk in comparison to illiquid stocks. A glance at the adjusted R^2 value provides evidence that market risk is a significant factor to capture a substantial amount of variation in stock returns, particularly for the portfolios of liquid stock. It is essential to point out that the adjusted R^2 value is low for illiquid stocks portfolios implying that the illiquid stocks portfolios have greater unexplained variations in their returns. The adjusted R^2 value declines as we move from P1 to P10 indicating that as illiquidity increases unexplained variations in portfolio returns also increases.

We advance our analysis to isolate the effect of liquidity risk in equity pricing at BSE and NSE by augmenting liquidity risk factor (IMV) in CAPM. The regression results of liquidity augmented standard CAPM are presented in table 3. With the insertion of liquidity factor in the asset pricing framework, there is a considerable improvement in adjusted R^2 values indicating that there is a significant enhancement in explaining variability of portfolio returns by liquidity-adjusted model. This implies that liquidity augmented asset pricing models can better explain cross-sectional variations in equity returns. Alpha values reduce and market factor coefficients continue to remain positive and significant across portfolios. However, when we involve liquidity risk factor in the asset pricing model, trend observed in intercept, adjusted R^2 and market beta values disappear. The liquidity-augmented model reveals that the liquidity (IMV) factor coefficients are statistically significant. Notably, the illiquid stocks portfolios have significantly positive IMV betas implying that investor's demand compensation for holding illiquid stocks; in contrast, the liquid stocks portfolios have significantly negative IMV betas suggesting that liquid stocks portfolios may offer lower returns for a given risk. A strong pattern of increasing slope coefficient of IMV factor is observed as we move from the portfolio of liquid to illiquid stocks (i.e. P1 to P10) implying that the illiquid stocks are more responsive to provide liquidity premium.

The liquidity premium is observed at both the exchanges such that investors get recompense through superior returns for holding illiquid stocks in their portfolios. The strength of results is proved using four alternate liquidity measures. Therefore, this research provides significant evidence for the pricing of liquidity risk at two leading stock exchanges in India.

[Insert Table 1 here]

[Insert Table 2 here]

[Insert Table 3 here]

January Effect

Table 4 presents the performance evaluation of liquidity portfolios of BSE and NSE for January & Non-January months. For non-January months, portfolios exhibit significantly positive average excess returns, while negative average portfolio returns are observed for January. An increasing trend in mean monthly excess returns is observed from portfolio P1 to P10 for non-January months, however no such pattern is noticed for January. Therefore, strong liquidity premium is observed only in non-January months at both the exchanges where illiquid stocks portfolio (P10) outperformed liquid stocks portfolio (P1). Similarly, performance evaluation ratios also mount from P1 to P10 across all proxies of liquidity during non-January months, however for January no such trend is observed and all these ratios are mostly negative. This indicates the existence of liquidity premium at BSE and NSE is confined to non-January months only with no premium visible in January.

Table 5 provides the results of standard CAPM for January & non-January months obtained by employing dummy variable regression. Results illustrate that in non-January months, abnormal returns (alpha values) are significantly positive for all portfolios and increases from P1 to P10 signifying that illiquid stock portfolio outperforms liquid stock portfolio. However, for January, abnormal returns are mostly negative implying that stocks prices fall severely and no fixed pattern is observed in its values as we move from P1 to P10. It is observed that abnormal returns of illiquid stocks portfolios (P9 & P10) are significantly higher in non-January months relative to January with differential returns being statistically significant across all liquidity proxies. At BSE, the liquidity premium earned for trading volume, turnover, relative spread & Illiq ratio sorted liquidity portfolios are found to be 3.68%, 1.18%, 3.82%, & 3.28% for non-January months and 0.29%, 0.97%, -0.42% & -1.29% for January respectively with differential being statistically significant. At NSE, the liquidity premium is found to be 3.66%, 1.34%, 3.07% & 2.86% for non-January months and 1.14%, 0.42%, -

0.56%, & -0.14% for January respectively. Liquidity premium in January is either very small or negative. Market betas are positive across portfolios and decreases as one move from P1 to P10 with the differential slopes being statistically insignificant between January & non-January months.

Table 6 presents dummy variable regression results of liquidity augmented Standard CAPM to isolate the January effect on liquidity premium at BSE and NSE. A strong pattern of increasing slope coefficient of IMV factor (β_{IMV}) is observed as we move from portfolio of liquid to illiquid stocks (P1 to P10) for non-January months. The illiquid stocks portfolios have positive and highly significant IMV betas; in contrast, the liquid stocks portfolios have negative IMV betas. Overall, the slope coefficient of the liquidity risk factor is higher in non-January months relative to January with differential slope being significant for illiquid stocks portfolio.

Eleswarapu & Reinganum (1993) stated the relationship between bid-ask spread and expected returns on stock to be seasonal at NYSE restricted to January only otherwise not. Our results evidence the existence of an inverse January effect on liquidity premium at both BSE and NSE in contrast to Eleswarapu & Reinganum (1993). The inverse January effect is noticed where significantly lower returns are observed for illiquid stocks during January relative to non-January months; indeed, the liquid stocks outperform illiquid stocks in January. Feasible reason for this occurrence could be that each year February end the Indian national budget is finalized which has critical repercussions for the securities market. A few months before the budget date there exists high uncertainties because of unexpected government policies. Therefore, the investors appear to hedge the macroeconomic insecurities by modifying their portfolios to liquid stocks and offload illiquid stocks. The existence of liquidity premium is confined to non-January months only where illiquid stocks have an edge over liquid stock as investors are rewarded with superior returns for including lesser liquid stocks in their portfolio. And so, the null hypothesis is rejected and finishes off with that the seasonality with respect to January effect does have a significant impact on liquidity premium as significantly higher premium can be earned in non-January months whereas January may provide negative or very low premium.

[Insert Table 4 here]

[Insert Table 5 here]

[Insert Table 6 here]

April Effect

Table 7 presents the performance evaluation of liquidity portfolios of BSE and NSE for April & Non-April months. Both for non-April & April months, liquidity portfolios exhibit significantly positive average excess returns and an increasing trend is observed in its values from portfolio P1 to P10. Performance evaluation ratios that are Sharpe, Treynor and information ratios, all boost up from portfolio P1 to P10 across all proxies of liquidity for both April & non-April months. The return tendency is much superior (more than double) in April relative to non-April months, this may be owing to tax-loss selling hypothesis or window dressing on financial year end similar to the US market January effect. Overall, illiquid stocks portfolio (P10) outperforms liquid stocks portfolio (P1) in both periods with returns being reasonably higher in April relative to non-April months at both the exchanges.

Table 8 provides the results of dummy variable regression on Standard CAPM to analyse the April effect on liquidity premium at BSE and NSE. In both non-April and April months, abnormal returns (alpha values) are significantly positive for all portfolios and increases from P1 to P10 signifying that illiquid stock portfolio outperforms liquid stock portfolio. However, it is observed that abnormal returns are significantly higher in April relative to non-April months with differential returns being statistically significant across all liquidity proxies. At BSE, the liquidity premium observed for trading volume, turnover, relative spread & Illiq ratio sorted liquidity portfolios are found to be 3.16%, 1.31%, 3.35% & 2.79% for non-April months and 7.31%, 0.25%, 6.32% & 5.78% for April respectively with differential being statistically significant. At NSE, the liquidity premium observed for trading volume, turnover, relative spread & Illiq ratio sorted liquidity portfolios are found to be 3.19%, 1.31%, 2.48%, & 2.33% for non-April months and 7.22%, 1.61%, 7.03% & 6.84% for April respectively with differential being statistically significant. Liquidity premium in April months is significantly higher in comparison to non-April months at both the exchanges. Market betas are positive across portfolios and higher in non-April relative to April with the differential slopes being statistically significant for illiquid stocks portfolios.

Table 9 illustrates dummy variable regression results of liquidity augmented Standard CAPM to isolate the April effect on liquidity premium at BSE and NSE. A strong pattern of increasing slope coefficient of IMV factor (β_{IMV}) is observed as we go from portfolio liquid to illiquid stocks (P1 to P10) for both April and non-April months. Overall, no fixed pattern of variation in slope coefficient of the liquidity risk factor is observed between April & other non-April months.

This put forward considerable evidence for the presence of strong April effect on liquidity premium both at BSE and NSE, to an extent similar to Eleswarapu & Reinganum (1993) January effect who reported seasonality of liquidity premium at NYSE as it was confined to January only otherwise not. But, at BSE and NSE we observed that liquidity premium can be earned in both April and non-April months but significantly higher premium is observed at April months with the differential return being statistically significant. It is observed that returns are significantly higher in April relative to non-April months. A probable explanation for this could be tax-loss selling and window dressing effect, where investors sell off stocks in losses in March end to lower their taxes on net capital gains or to present a better picture of their financial position and thereafter reinvest in next month resulting in large April returns.

Thus, the null hypothesis is not accepted seeing that seasonality with respect to April effect does have a significant impact on liquidity premium as significantly higher premium can be earned in April at both the exchanges may be due to tax-loss selling and window dressing hypotheses which is exactly similar to US market January effect.

[Insert Table 7 here]

[Insert Table 8 here]

[Insert Table 9 here]

CONCLUSION

This study addresses the seasonal behavior relating to January and April effect on liquidity premium at BSE and NSE with a sample of BSE 500 stocks and Nifty 500 stocks representative of two exchanges for time span from 1st April, 2000 to 31st March, 2017 by employing four different liquidity measures to strengthen the robustness of results. In harmony with the seminal work of Amihud & Mendelson (1986) in U.S. equity market, we have seen the presence of strong liquidity premium with a negative liquidity & stock returns relationship both at BSE and NSE signifying that investors call for extra return for being exposed to liquidity risk. It provides evidence for the reality of significant January effect on liquidity premium in contrast to Eleswarapu & Reinganum (1993). Liquidity premium can be earned in non-January months where illiquid stocks outperformed liquid stocks and January generates negative liquidity premium where liquid stocks outperformed illiquid stocks. The possible explanation for this occurrence could be that each year February end the Indian national budget is finalized which has critical repercussions for the securities market. It further

provides considerable evidence for the existence of strong April effect on liquidity premium at both exchanges to an extent similar to Eleswarapu & Reinganum (1993). We observed that significantly higher liquidity premium can be earned in April may be due to tax-loss selling and window dressing hypotheses which are exactly similar to US market January effect. On the whole, we wrap up by ruling that seasonality on account of January and April effect, have a substantial impact on liquidity premium on liquidity premium at BSE and NSE in Indian stock market.

The research has significant strategic inferences and is of pertinent use for companies, regulators and policymakers, stock analysts and the entire investment community. Investors and analysts may adopt a liquidity-based investment strategy that may provide extra risk-adjusted returns instead of relying on fundamental and technical portfolio management analysis. The investment basket can be designed using liquidity risk-return trade-off taking into consideration investor's investment horizon and risk aversion. Companies should enhance the liquidity of assets and increase transparency in their operations with better information availability to reduce their cost of capital. Companies can go for voluntary disclosures, even if they were not mandatory, publish forecasts and other data and provide ratings for their assets for improving liquidity to lessen the yield. The study illustrates the significance of microstructure and policies designed to enhance liquidity of securities and the market as a whole. Market regulators need to introduce strict norms and rules pertaining to facilitate a well-organized competitive market environment for exchange of securities. Proper designing of trading system, efficient execution of transaction, fair competition among market participants, enforcing rule that equalize disclosure to investors, to bring transparency in companies operations and restrict trading on insider's information all that can boost the liquidity and information symmetry and thereby promoting investment and economic growth in the country.

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TABLES

Table 1: Performance Evaluation of Liquidity-Sorted Portfolios

	BSE					NSE				
Portfolios	**P1 (Liquid)**	**P2**	**P9**	**P10 (Illiquid)**	**P10-P1**	**P1 (Liquid)**	**P2**	**P9**	**P10 (Illiquid)**	**P10-P1**
L1: Trading Volume										
Mean	0.0066	0.0109	0.0303	0.0384	0.0318	0.0036	0.0088	0.0243	0.0367	0.0331
t-stat.	0.949	1.700*	4.539***	5.882***	5.426***	0.556	1.431	4.020***	5.703***	6.453***
Sharpe Ratio	0.0670	0.1199	0.3202	0.4149	0.4657	0.0392	0.1009	0.2836	0.4023	0.5487
Treynor Ratio	0.0052	0.0095	0.0296	0.0394	-0.1075	0.0032	0.0082	0.0266	0.0391	-0.1798
Information Ratio	-0.0291	0.1042	0.4052	0.5361	0.1598	-0.0984	0.0449	0.3271	0.5025	0.1921
L2: Turnover Rate										
Mean	0.0162	0.0203	0.0223	0.0242	0.0080	0.0116	0.0139	0.0227	0.0210	0.0093
t-stat.	1.958*	2.908***	3.923***	4.296***	5.520***	1.431	2.051**	3.976***	3.757***	5.830***
Sharpe Ratio	0.1381	0.2051	0.2767	0.3030	0.1234	0.1009	0.1447	0.2805	0.2650	0.1478
Treynor Ratio	0.0112	0.0165	0.0239	0.0261	-0.0156	0.0084	0.0119	0.0254	0.0247	-0.0177
Information Ratio	0.1503	0.3079	0.3590	0.4104	-0.0419	0.0751	0.1599	0.3317	0.2818	-0.0279
L3: Relative (Quoted) Spread										
Mean	0.0069	0.0111	0.0275	0.0406	0.0337	0.0060	0.0086	0.0237	0.0332	0.0272
t-stat.	1.058	1.765*	4.354***	5.908***	5.827***	1.010	1.415	3.873***	5.091***	5.360***
Sharpe Ratio	0.0746	0.1245	0.3071	0.4167	0.4947	0.0712	0.0998	0.2732	0.3591	0.4773
Treynor Ratio	0.0058	0.0098	0.0270	0.0403	-0.1834	0.0058	0.0082	0.0247	0.0346	-0.3147
Information Ratio	-0.0209	0.1131	0.4189	0.5317	0.1851	-0.0337	0.0379	0.3374	0.4444	0.1460
L4: Amihud Illiquidity Ratio										
Mean	0.0093	0.0106	0.0265	0.0386	0.0292	0.0059	0.0096	0.0241	0.0312	0.0252
t-stat.	1.491	1.699*	4.416***	5.324***	5.061***	0.999	1.577	3.813***	4.805***	4.808***
Sharpe Ratio	0.1051	0.1199	0.2925	0.3755	0.4434	0.0704	0.1112	0.2689	0.3389	0.4370
Treynor Ratio	0.0082	0.0094	0.0265	0.0349	-0.7133	0.0056	0.0092	0.0250	0.0330	-0.2345
Information Ratio	0.0646	0.1042	0.3668	0.4995	0.1575	-0.0400	0.0657	0.3148	0.4040	0.1242

Note: Statistical level of significance at 1%, 5% & 10% is indicated by ***, ** & * respectively

Table 2: Results of Standard CAPM for Liquidity-Sorted Portfolios

Portfolios		BSE					NSE				
		P1 (Liquid)	**P2**	**P9**	**P10 (Illiquid)**	**P10-P1**	**P1 (Liquid)**	**P2**	**P9**	**P10 (Illiquid)**	**P10-P1**
L1: Trading Volume											
Constant	$\propto$	-0.0030	0.0021	0.0225	0.0310	0.0340	-0.0045	0.0011	0.0178	0.0300	0.0344
	t-stat.	-1.5353	1.0141	5.657***	7.5953***	7.4112***	-1.7774*	0.4553	4.8007***	7.2025***	8.2469***
Market	β_m	1.2690	1.1557	1.0246	0.9736	-0.2954	1.1222	1.0643	0.9154	0.9381	-0.1841
	t-stat.	47.8595***	40.77***	19.2118***	17.8383***	-4.8082***	33.3097***	31.5932***	18.4343***	16.8327***	-3.292***
Adjusted R^2		0.9197	0.8925	0.6479	0.6133	0.0996	0.8472	0.8329	0.6288	0.5854	0.0469
L2: Turnover Rate											
Constant	$\propto$	0.0052	0.0110	0.0152	0.0172	0.0119	0.0018	0.0055	0.0163	0.0149	0.0131
	t-stat.	1.5747	4.1087***	5.2635***	6.0163***	3.1969***	0.4758	1.9329*	4.9774***	4.4006***	3.7335***
Market	β_m	1.4437	1.2322	0.9332	0.9281	-0.5156	1.3755	1.1704	0.8916	0.8476	-0.5279
	t-stat.	32.4837***	34.4249***	24.1626***	24.2829***	-10.304***	27.5741***	30.6505***	20.3364***	18.6932***	-11.2124***
Adjusted R^2		0.8405	0.8555	0.7445	0.7464	0.3446	0.7915	0.8243	0.6735	0.6353	0.3841
L3: Relative (Quoted) Spread											
Constant	$\propto$	-0.0021	0.0025	0.0197	0.0329	0.0351	-0.0015	0.0011	0.0168	0.0263	0.0278
	t-stat.	-1.0660	1.2071	5.8555***	7.4664***	7.399***	-0.6218	0.4272	4.834***	6.3301***	6.9154***
Market	β_m	1.1919	1.1271	1.0176	1.0084	-0.1835	1.0477	1.0397	0.9623	0.9613	-0.0864
	t-stat.	44.9385***	40.569***	22.5662***	17.0694***	-2.8929***	33.298***	29.6668***	20.6236***	17.2442***	-1.6039
Adjusted R^2		0.9098	0.8916	0.7176	0.5921	0.0355	0.8471	0.8147	0.6797	0.5971	0.0078
L4: Amihud Illiquidity Ratio											
Constant	$\propto$	0.0006	0.0020	0.0189	0.0302	0.0295	-0.0016	0.0021	0.0172	0.0244	0.0260
	t-stat.	0.3637	1.0435	5.1601***	6.9024***	6.3106***	-0.7346	0.8002	4.5056***	5.797***	6.4006***
Market	β_m	1.1450	1.1312	1.0002	1.1041	-0.0410	1.0510	1.0483	0.9635	0.9434	-0.1076
	t-stat.	48.7057***	43.5509***	20.4057***	18.8596***	-0.6538	36.0217***	29.2909***	18.8005***	16.7263***	-1.9768**
Adjusted R^2		0.9222	0.9046	0.6750	0.6394	-0.0029	0.8664	0.8108	0.6380	0.5823	0.0143

Note: Statistical level of significance at 1%, 5% & 10% is indicated by ***, ** & * respectively

Table 3: Results of Liquidity Augmented Standard CAPM for Liquidity-Sorted Portfolios

Portfolios		BSE					NSE				
		P1 (Liquid)	**P2**	**P9**	**P10 (Illiquid)**	**P10-P1**	**P1 Liquid)**	**P2**	**P9**	**P10 (Illiquid)**	**P10-P1**
L1: Trading Volume											
Constant	$\propto$	0.0017	0.0046	0.0007	0.0079	0.0063	-0.0004	0.0040	-0.0011	0.0075	0.0079
	t-stat.	0.8114	1.9996**	0.2814	3.2764***	2.8783***	-0.1341	1.4313	-0.3744	2.509**	3.9271***
Market	β_m	1.2293	1.1348	1.2086	1.1679	-0.0614	1.0940	1.0448	1.0450	1.0922	-0.0019
	t-stat.	47.4075***	38.8625***	37.7546***	38.2552***	-2.237**	32.2605***	30.3652***	29.4373***	29.4985***	-0.0750
Liquidity	β_{IMV}	-0.4386	-0.2309	2.0332	2.1468	2.5854	-0.3956	-0.2735	1.8199	2.1654	2.5611
	t-stat.	-5.35***	-2.5006**	20.0893***	22.243***	29.8016***	-3.3514***	-2.2833**	14.7281***	16.8023***	29.6518***
Adjusted R^2		0.9295	0.8953	0.8835	0.8889	0.8350	0.8546	0.8364	0.8220	0.8282	0.8239
L2: Turnover Rate											
Constant	$\propto$	0.0093	0.0129	0.0113	0.0133	0.0040	0.0087	0.0090	0.0091	0.0082	-0.0005
	t-stat.	3.1971***	4.9805***	4.6072***	5.4926***	2.113**	2.447**	3.1433***	3.0571***	2.583**	-0.2775
Market	β_m	1.2288	1.1300	1.1378	1.1301	-0.0987	1.1507	1.0558	1.1262	1.0660	-0.0848
	t-stat.	26.3948***	27.2696***	29.1279***	29.211***	-3.276***	20.2484***	22.9241***	23.6268***	20.9645***	-3.0432***
Liquidity	β_{IMV}	-1.2931	-0.6151	1.2308	1.2155	2.5086	-1.3269	-0.6764	1.3851	1.2894	2.6162
	t-stat.	-8.2048***	-4.3848***	9.308***	9.2814***	24.5988***	-6.557***	-4.1247***	8.1611***	7.1217***	26.3809***
Adjusted R^2		0.8804	0.8676	0.8214	0.8224	0.8376	0.8279	0.8374	0.7545	0.7082	0.8629
L3: Relative (Quoted) Spread											
Constant	$\propto$	0.0021	0.0028	0.0013	0.0068	0.0046	0.0015	0.0019	0.0003	0.0049	0.0034
	t-stat.	1.0055	1.2175	0.5286	2.4414**	1.9717*	0.5831	0.6565	0.1111	1.6407	1.7506*
Market	β_m	1.1592	1.1245	1.1595	1.2099	0.0507	1.0354	1.0364	1.0311	1.0506	0.0152
	t-stat.	43.8653***	38.7678***	38.2105***	35.0289***	1.7309*	33.0507***	29.2087***	30.7189***	28.8932***	0.6427
Liquidity	β_{IMV}	-0.3959	-0.0312	1.7176	2.4383	2.8342	-0.3148	-0.0840	1.7609	2.2858	2.6006
	t-stat.	-4.4195***	-0.3170	16.6983***	20.8258***	28.545***	-2.675***	-0.6300	13.9652***	16.7345***	29.283***
Adjusted R^2		0.9175	0.8911	0.8821	0.8715	0.8105	0.8517	0.8141	0.8378	0.8323	0.8129
L4: Amihud Illiquidity Ratio											
Constant	$\propto$	0.0033	0.0019	0.0007	0.0070	0.0037	0.0004	0.0028	0.0018	0.0069	0.0066
	t-stat.	1.7783*	0.9050	0.3072	2.9311***	1.6672*	0.1540	0.9878	0.6649	2.4296**	3.3596***
Market	β_m	1.1355	1.1315	1.0653	1.1873	0.0519	1.0429	1.0455	1.0277	1.0160	-0.0268

Portfolios		BSE					NSE				
		P1 (Liquid)	**P2**	**P9**	**P10 (Illiquid)**	**P10-P1**	**P1 Liquid)**	**P2**	**P9**	**P10 (Illiquid)**	**P10-P1**
	t-stat.	49.4012***	43.1673***	36.8187***	40.4547***	1.9147*	35.9174***	28.9714***	30.2502***	28.2829***	-1.0887
Liquidity	β_{IMV}	-0.2828	0.0112	1.9273	2.4630	2.7459	-0.2459	-0.0866	1.9429	2.1996	2.4455
	t-stat.	-3.605***	0.1254	19.5128***	24.5845***	29.7044***	-2.3928**	-0.6783	16.1597***	17.301***	28.0341***
Adjusted R^2		0.9266	0.9041	0.8883	0.9106	0.8153	0.8695	0.8103	0.8431	0.8328	0.8006

Note: Statistical level of significance at 1%, 5% & 10% is indicated by ***, ** & * respectively.

Table 4: Performance Evaluation of Liquidity-Sorted Portfolios for January & Non-January Months

Portfolios		BSE					NSE				
		P1	**P2**	**P9**	**P10**	**P10-P1**	**P1**	**P2**	**P9**	**P10**	**P10-P1**
L1: Trading Volume											
Non-January	Mean	0.0086	0.0137**	0.0345***	0.0425***	0.0340***	0.006	0.0107*	0.0288***	0.0409***	0.0349***
	Sharpe Ratio	0.0874	0.1515	0.3656	0.4608	0.4940	0.0663	0.1245	0.3399	0.4502	0.5763
	Treynor Ratio	0.0068	0.0120	0.0341	0.0442	-0.1136	0.0054	0.0102	0.0322	0.0442	-0.1819
	Information Ratio	-0.0266	0.1341	0.4408	0.5676	0.2101	-0.0822	0.0454	0.3715	0.5347	0.2428
January	Mean	-0.0146	-0.0186	-0.0153	-0.0068	0.0078	-0.0229	-0.012	-0.0238	-0.0088	0.0141
	Sharpe Ratio	-0.1389	-0.1868	-0.1748	-0.0811	-0.1389	-0.2483	-0.1238	-0.2773	-0.1033	-0.2483
	Treynor Ratio	-0.0105	-0.0145	-0.0143	-0.0068	-0.0105	-0.0196	-0.0098	-0.0230	-0.0090	-0.0196
	Information Ratio	-0.0519	-0.1557	-0.0679	0.1436	0.1801	-0.3116	0.0378	-0.2864	0.1051	0.2606
L2: Turnover Rate											
Non-January	Mean	0.0202**	0.0237***	0.0259***	0.0273***	0.0071	0.0157**	0.0174***	0.0265***	0.0245***	0.0089
	Sharpe Ratio	0.1738	0.2411	0.3229	0.3411	0.1084	0.1381	0.1840	0.3292	0.3108	0.1418
	Treynor Ratio	0.0142	0.0194	0.0278	0.0296	-0.0141	0.0116	0.0151	0.0301	0.0292	-0.0174
	Information Ratio	0.1896	0.3479	0.4054	0.4329	-0.0189	0.1120	0.2001	0.3655	0.3109	-0.0015
January	Mean	-0.0272	-0.016	-0.0168	-0.0092	0.018	-0.0321	-0.0243	-0.0183	-0.0176	0.0145
	Sharpe Ratio	-0.2221	-0.1522	-0.2217	-0.1268	-0.2221	-0.2512	-0.2317	-0.2405	-0.2429	-0.2512
	Treynor Ratio	-0.0173	-0.0119	-0.0192	-0.0101	-0.0173	-0.0198	-0.0185	-0.0196	-0.0206	-0.0198

Portfolios		**BSE**					**NSE**				
		P1	**P2**	**P9**	**P10**	**P10-P1**	**P1**	**P2**	**P9**	**P10**	**P10-P1**
	Information Ratio	-0.2456	-0.0762	-0.1014	0.1150	0.2411	-0.3094	-0.2584	-0.1666	-0.1197	0.1995
L3: Relative (Quoted) Spread											
Non-January	Mean	0.0090*	0.0141***	0.0310***	0.0456***	0.0366**	0.0080*	0.0119**	0.0274***	0.0379***	0.0299*
	Sharpe Ratio	0.0978	0.1608	0.3481	0.4685	0.5385	0.0952	0.1428	0.3171	0.4117	0.5311
	Treynor Ratio	0.0076	0.0127	0.0308	0.0455	-0.2120	0.0077	0.0118	0.0286	0.0400	-0.3482
	Information Ratio	-0.0151	0.1559	0.4479	0.5795	0.2470	-0.0324	0.0782	0.3733	0.4858	0.2126
January	Mean	-0.0153	-0.0217	-0.0107	-0.0137	0.0016	-0.0149	-0.0273	-0.0164	-0.0175	-0.0026
	Sharpe Ratio	-0.1459	-0.2203	-0.1222	-0.1657	-0.1459	-0.1561	-0.2570	-0.1984	-0.2085	-0.1561
	Treynor Ratio	-0.0110	-0.0172	-0.0098	-0.0148	-0.0110	-0.0123	-0.0204	-0.0176	-0.0178	-0.0123
	Information Ratio	-0.0712	-0.2338	0.0523	-0.0229	0.1193	-0.0463	-0.3242	-0.0691	-0.1044	0.1006
L4: Amihud Illiquidity Ratio											
Non-January	Mean	0.0113	0.0134**	0.0301***	0.0440***	0.0327***	0.0082	0.0117*	0.0285***	0.0358***	0.0276***
	Sharpe Ratio	0.1288	0.1530	0.3356	0.4278	0.5016	0.0978	0.1375	0.3223	0.3919	0.4770
	Treynor Ratio	0.0100	0.0120	0.0307	0.0397	-1.3240	0.0078	0.0114	0.0303	0.0385	-0.2346
	Information Ratio	0.0706	0.1366	0.3965	0.5586	0.2312	-0.0273	0.0705	0.3584	0.4459	0.1836
January	Mean	-0.012	-0.0199	-0.0125	-0.0199	-0.0079	-0.0187	-0.0128	-0.0236	-0.0186	0.0001
	Sharpe Ratio	-0.1205	-0.2107	-0.1331	-0.2365	-0.1205	-0.2177	-0.1259	-0.2585	-0.2139	-0.2177
	Treynor Ratio	-0.0092	-0.0157	-0.0108	-0.0219	-0.0092	-0.0170	-0.0100	-0.0216	-0.0189	-0.0170
	Information Ratio	0.0162	-0.2727	0.0016	-0.1410	0.0398	-0.2107	0.0137	-0.2511	-0.1144	0.1363

Note: Statistical level of significance at 1%, 5% & 10% is indicated by ***, ** & * respectively

Table 5: Results of Standard CAPM of Liquidity-Sorted Portfolios for January & Non-January Months

Portfolios		BSE					NSE				
		P1	P2	P9	P10	P10-P1	P1	P2	P9	P10	P10-P1
L1: Trading Volume											
Non-January	$\propto$	-0.0033	0.0028	0.0249***	0.0334***	0.0368***	-0.0041	0.0011	0.0207***	0.0324***	0.0366***
	β_m	1.2603***	1.1424***	1.0119***	0.9612***	-0.299***	1.1167***	1.0495***	0.8937***	0.925***	-0.1916***
January	$\propto$	0.0028	-0.0024	-0.0018*	0.0058*	0.0029**	-0.0072	0.0044	-0.0099**	0.0041*	0.0114*
	β_m	1.3904	1.2858	1.0666	1.0082	-0.3821	1.1682	1.2331	1.0346	0.9726	-0.1955
L2: Turnover Rate											
Non-January	$\propto$	0.0067*	0.0121***	0.017***	0.0185***	0.0118***	0.0034	0.0069**	0.0185***	0.0169***	0.0134***
	β_m	1.4275***	1.2186***	0.9307***	0.9241***	-0.5034***	1.3474***	1.1521***	0.879***	0.8391***	-0.5083***
January	$\propto$	-0.0074	0.0009	-0.0057**	0.0022**	0.0097*	-0.0104	-0.0067	-0.0058**	-0.0062*	0.0042
	β_m	1.5716	1.3431	0.8746	0.9107	-0.6609	1.6244	1.3153	0.9358	0.8530	-0.7714
L3: Relative (Quoted) Spread											
Non-January	$\propto$	-0.0021	0.0035	0.0214***	0.0361***	0.0382***	-0.0013	0.0027	0.0187***	0.0293***	0.0307***
	β_m	1.1759***	1.112***	1.0051***	1.0031***	-0.1727***	1.0336***	1.0076***	0.9574***	0.9477***	-0.0859
January	$\propto$	0.0022	-0.0057	0.0030*	-0.002**	-0.0042**	0.0012	-0.0094	-0.0039*	-0.0043**	-0.0056**
	β_m	1.3896**	1.2614	1.0881	0.9220	-0.4675	1.2075	1.3377***	0.9311	0.9832	-0.2242
L4: Amihud Illiquidity Ratio											
Non-January	$\propto$	0.0006	0.0028	0.0208***	0.0334***	0.0328***	-0.0012	0.0024	0.02***	0.0273***	0.0286***
	β_m	1.1317***	1.1172***	0.9799***	1.1071***	-0.0246	1.0459***	1.0268***	0.9417***	0.9284***	-0.1174**
January	$\propto$	0.0044	-0.0039	0.0020*	-0.0084***	-0.0129***	-0.0040	0.0043	-0.009**	-0.0054**	-0.0014**
	β_m	1.3102**	1.2630	1.1584	0.9097	-0.4005	1.0945	1.2855**	1.0892	0.9823	-0.1122

Note: (i) Statistical level of significance at 1%, 5% & 10% is indicated by ***, ** & * respectively. (ii) Statistical significance of alpha and beta coefficients for January represents the significance of differential slope and beta coefficients in dummy variable regression

Table 6: Results of Liquidity Augmented Standard CAPM of Liquidity-Sorted Portfolios for January & Non-January Months

Portfolios		BSE					NSE				
		P1	P2	P9	P10	P10-P1	P1	P2	P9	P10	P10-P1
L1: Trading Volume											
Non-January	$\propto$	0.0013	0.0053**	0.0010	0.0079***	0.0066***	0.0001	0.0039	0.0001	0.0079**	0.0078***
	β_m	1.2243***	1.1229***	1.1961***	1.1573***	-0.0669**	1.0899***	1.0319***	1.0248***	1.0811***	-0.0087
	β_{IMV}	-0.4013***	-0.2176**	2.0536***	2.1847***	2.586***	-0.3742***	-0.2457*	1.8266***	2.1752***	2.5494***
January	$\propto$	0.0029	-0.0023	-0.0019	0.0057	0.0027	-0.0071	0.0045	-0.0102	0.0038	0.0109
	β_m	1.2476	1.1932	1.3029	1.2200	-0.0275	1.0641	1.1614	1.1822	1.1722	0.1081
	β_{IMV}	-0.9977	-0.6466	1.6505*	1.4792*	2.4770	-0.9843	-0.6783	1.3971*	1.8887*	2.8731
L2: Turnover Rate											
Non-January	$\propto$	0.0111***	0.0141***	0.013***	0.0143***	0.0031	0.0109***	0.0105***	0.0106***	0.0095***	-0.0013
	β_m	1.212***	1.1256***	1.1249***	1.1284***	-0.0835***	1.127***	1.0465***	1.1106***	1.056***	-0.0709**
	β_{IMV}	-1.3182***	-0.5687***	1.1876***	1.2494***	2.5677***	-1.3296***	-0.6369***	1.397***	1.3089***	2.6386***
January	$\propto$	-0.0075*	0.0008	-0.0056**	0.0023	0.0098	-0.0109*	-0.0071*	-0.0055	-0.0059	0.0049
	β_m	1.3441	1.0693	1.2142	1.0501	-0.294*	1.2778	0.9997	1.1846	1.0494	-0.2283
	β_{IMV}	-1.0867	-1.3080	1.6222	0.6662*	1.7529**	-1.5078	-1.3727	1.0824	0.8544*	2.3623
L3: Relative (Quoted) Spread											
Non-January	$\propto$	0.0022	0.0040	0.0009	0.0073**	0.005**	0.0011	0.0030	0.0008	0.0056*	0.0045**
	β_m	1.1465***	1.1091***	1.1427***	1.196***	0.0494	1.0251***	1.0065***	1.0181***	1.0278***	0.0027
	β_{IMV}	-0.3769***	-0.0376	1.7656***	2.4738***	2.8507***	-0.251**	-0.0302	1.7804***	2.3491***	2.6002***
January	$\propto$	0.0017	-0.0058	0.0042	-0.0004	-0.0022	0.0016	-0.0092	-0.0046	-0.0050	-0.0066*
	β_m	1.2983	1.2471	1.3454	1.2615	-0.0368	1.0919	1.254*	1.1286	1.1815	0.0895
	β_{IMV}	-0.4978	-0.0783	1.4033	1.8512*	2.3490*	-0.9074	-0.6571	1.5503	1.5562*	2.4637
L4: Amihud Illiquidity Ratio											
Non-January	$\propto$	0.0033*	0.0028	0.0003	0.0078***	0.0045**	0.0007	0.0028	0.0025	0.0077**	0.0069***
	β_m	1.1232***	1.1171***	1.0446***	1.1881***	0.0649**	1.0385***	1.0253***	1.0043***	0.9988***	-0.0397
	β_{IMV}	-0.2574***	-0.0027	1.9494***	2.4405***	2.698***	-0.2303**	-0.0445	1.9575***	2.201***	2.4314***
January	$\propto$	0.0026	-0.0037	0.0078	-0.0012	-0.0038	-0.0063	0.0022	-0.0036	0.0012	0.0076
	β_m	1.2524	1.2685	1.3393***	1.1368	-0.1156*	1.0318	1.2301	1.2353*	1.1648	0.133*
	β_{IMV}	-0.6287	0.0599	1.9698	2.4718	3.1006	-0.7052	-0.6220	1.6403	2.0499	2.7552

Note: (i) Statistical level of significance at 1%, 5% & 10% is indicated by ***, ** & * respectively.
(ii) Statistical significance of alpha and beta coefficients for January represents the significance of differential slope and beta coefficients in dummy variable regression

Table 7: Performance Evaluation of Liquidity-Sorted Portfolios for April & Non-April Months

Portfolios		BSE					NSE				
		P1	P2	P9	P10	P10-P1	P1	P2	P9	P10	P10-P1
L1: Trading Volume											
Non-April	Mean	0.0040**	0.0079**	0.0261**	0.0340**	0.0300***	0.0018**	0.0066**	0.0206**	0.0327**	0.0309***
	Sharpe Ratio	0.0398	0.0856	0.2724	0.3639	0.4504	0.0194	0.0741	0.2378	0.3536	0.5170
	Treynor Ratio	0.0031	0.0068	0.0254	0.0343	-0.1084	0.0016	0.0061	0.0221	0.0345	-0.1836
	Information Ratio	-0.0628	0.0563	0.3574	0.4999	0.2062	-0.1181	0.0138	0.2889	0.4586	0.2335
April	Mean	0.0369**	0.0455**	0.0787**	0.0893**	0.0524**	0.0240**	0.0340**	0.0681**	0.0825**	0.0585**
	Sharpe Ratio	0.4799	0.7492	1.2543	1.3782	0.6180	0.3235	0.6024	1.0331	1.4113	0.9314
	Treynor Ratio	0.0286	0.0492	0.1070	0.2049	-0.0613	0.0198	0.0456	0.1699	0.1633	-0.0827
	Information Ratio	0.4522	0.6958	1.1092	0.9574	0.2227	0.1226	0.3464	0.6942	1.0841	0.3741
L2: Turnover Rate											
Non-April	Mean	0.0113**	0.0170**	0.0191**	0.0214**	0.0101***	0.0076**	0.0110**	0.0203**	0.0176**	0.0100**
	Sharpe Ratio	0.0954	0.1670	0.2350	0.2634	0.1540	0.0654	0.1138	0.2468	0.2210	0.1553
	Treynor Ratio	0.0079	0.0136	0.0203	0.0229	-0.0202	0.0056	0.0095	0.0225	0.0206	-0.0191
	Information Ratio	0.0897	0.2595	0.3300	0.3807	0.0315	0.0259	0.1191	0.3078	0.2418	0.0306
April	Mean	0.0728**	0.0595**	0.0591**	0.0568**	-0.0160**	0.0576**	0.0470**	0.0500**	0.0599**	0.0023**
	Sharpe Ratio	0.8434	1.1162	0.9462	1.0432	-0.2914	0.6915	0.5844	0.8790	0.9518	0.0427
	Treynor Ratio	0.0509	0.0760	0.0921	0.0856	0.0209	0.0442	0.0375	0.0859	0.1011	-0.0032
	Information Ratio	1.2874	1.1103	0.6380	0.7450	-0.3799	0.7958	0.5973	0.5820	0.6914	-0.1736
L3: Relative (Quoted) Spread											
Non-April	Mean	0.0046**	0.0080**	0.0231**	0.0370**	0.0325**	0.0047**	0.0061**	0.0208**	0.0291**	0.0244**
	Sharpe Ratio	0.0483	0.0883	0.2569	0.3734	0.4793	0.0542	0.0698	0.2370	0.3106	0.4380
	Treynor Ratio	0.0038	0.0071	0.0225	0.0363	-0.1952	0.0045	0.0059	0.0215	0.0299	-0.3319
	Information Ratio	-0.0504	0.0598	0.3768	0.4962	0.2379	-0.0423	-0.0006	0.3073	0.3998	0.1856
April	Mean	0.0345**	0.0467**	0.0779**	0.0819**	0.0473**	0.0218**	0.0373**	0.0580**	0.0812**	0.0593**
	Sharpe Ratio	0.4608	0.7694	1.1593	1.3009	0.6568	0.3355	0.5775	0.8102	1.2889	0.9401
	Treynor Ratio	0.0271	0.0484	0.1296	0.1320	-0.0723	0.0201	0.0364	0.0769	0.1563	-0.1047
	Information Ratio	0.4229	0.8650	0.8633	1.0217	0.2049	0.0822	0.5273	0.6378	0.9945	0.3964

Portfolios		**BSE**					**NSE**				
		P1	**P2**	**P9**	**P10**	**P10-P1**	**P1**	**P2**	**P9**	**P10**	**P10-P1**
L4: Amihud Illiquidity Ratio											
Non-April	Mean	0.0070**	0.0077**	0.0229**	0.0348**	0.0278**	0.0045**	0.0080**	0.0195**	0.0273**	0.0228***
	Sharpe Ratio	0.0780	0.0852	0.2494	0.3331	0.4228	0.0532	0.0904	0.2188	0.2921	0.4016
	Treynor Ratio	0.0062	0.0068	0.0227	0.0313	-1.1013	0.0043	0.0076	0.0202	0.0285	-0.2616
	Information Ratio	0.0310	0.0519	0.3283	0.4596	0.2126	-0.0513	0.0507	0.2647	0.3606	0.1668
April	Mean	0.0364**	0.0448**	0.0677**	0.0825**	0.0461**	0.0221**	0.0282**	0.0775**	0.0758**	0.0537**
	Sharpe Ratio	0.4850	0.6989	1.1073	1.2016	0.6723	0.3038	0.5221	0.9623	1.3370	0.8398
	Treynor Ratio	0.0286	0.0428	0.1016	0.1046	-0.0945	0.0181	0.0348	0.1093	0.1643	-0.0707
	Information Ratio	0.4926	0.8666	0.8426	1.0922	0.2069	0.0794	0.2626	0.7992	0.9614	0.3215

Note: Statistical level of significance at 1%, 5% & 10% is indicated by ***, ** & * respectively

Table 8: Results of Standard CAPM of Liquidity-Sorted Portfolios for April & Non-April Months

Portfolios		BSE					NSE				
		P1	P2	P9	P10	P10-P1	P1	P2	P9	P10	P10-P1
L1: Trading Volume											
Non-April	$\propto$	-0.0038*	0.0007	0.0198***	0.0278***	0.0316***	-0.005*	0.0001	0.0148***	0.0269***	0.0319***
	β_m	1.2654***	1.1621***	1.0293***	0.9888***	-0.2766***	1.1171***	1.0747***	0.9298***	0.9487***	-0.1684***
April	$\propto$	0.0055	0.023***	0.0608***	0.0787***	0.0731**	0.0004	0.0194**	0.0603***	0.0727***	0.0722**
	β_m	1.2903	0.9245*	0.7354	0.4357**	-0.8546*	1.2125	0.7457*	0.4009**	0.5054**	-0.7071*
L2: Turnover Rate											
Non-April	$\propto$	0.0024	0.0092***	0.0132***	0.0156***	0.0131***	-0.0007	0.0039	0.0148***	0.0123***	0.0131***
	β_m	1.4354***	1.2478***	0.9408***	0.9356***	-0.4997***	1.3725***	1.1632***	0.9008***	0.8521***	-0.5203***
April	$\propto$	0.0381***	0.0404***	0.0435***	0.0406**	0.0025	0.0322**	0.0226*	0.0387*	0.0483***	0.0161
	β_m	1.429	0.7825***	0.6415	0.6628*	-0.7662	1.3054	1.2532	0.5824	0.5927**	-0.7126
L3: Relative (Quoted) Spread											
Non-April	$\propto$	-0.0027	0.001	0.0167***	0.0307***	0.0335***	-0.0017	-0.0002	0.0148***	0.0231***	0.0248***
	β_m	1.1859***	1.1299***	1.0275***	1.0195***	-0.1663**	1.0455***	1.037***	0.9662***	0.972***	-0.0735
April	$\propto$	0.0036	0.0233***	0.0633***	0.0668**	0.0632**	0.0007	0.0174*	0.0433**	0.071***	0.0703***
	β_m	1.2753	0.9646	0.6008**	0.6203*	-0.655	1.0862	1.0245	0.7546	0.5193**	-0.5668*
L4: Amihud Illiquidity Ratio											
Non-April	$\propto$	0	0.0006	0.0167***	0.0279***	0.0279***	-0.0018	0.0015	0.0136***	0.0214***	0.0233***
	β_m	1.1368***	1.1308***	1.0088***	1.1116***	-0.0252	1.0434***	1.0567***	0.9655***	0.9563***	-0.087
April	$\propto$	0.0054	0.0194**	0.0515**	0.0633**	0.0578**	-0.0016	0.0124	0.0637***	0.0668***	0.0684***
	β_m	1.2755	1.0471	0.6663**	0.7882*	-0.4873	1.2208	0.8122	0.7092	0.4612*	-0.7595**

Note: (i) Statistical level of significance at 1%, 5% & 10% is indicated by ***, ** & * respectively. (ii) Statistical significance of alpha and beta coefficients for April represents the significance of differential slope and beta coefficients in dummy variable regression.

Table 9: Results of Liquidity Augmented Standard CAPM of Liquidity-Sorted Portfolios for April & Non-April Months

Portfolios		BSE					NSE				
		P1	P2	P9	P10	P10-P1	P1	P2	P9	P10	P10-P1
L1: Trading Volume											
Non-April	$\propto$	0.0007	0.0035	-0.0003	0.0069***	0.0061***	-0.0007	0.0033	-0.0013	0.0065**	0.0072***
	β_m	1.2257***	1.138***	1.2051***	1.1712***	-0.0544*	1.0868***	1.0511***	1.0461***	1.0945***	0.0077
	β_{IMV}	-0.4568***	-0.2771***	2.0202***	2.0961***	2.553***	-0.4512***	-0.351***	1.7294***	2.1669***	2.6181***
April	$\propto$	0.0164	0.0278**	0.0187	0.0294*	0.013	0.0024	0.0238	0.0076	0.03	0.0276**
	β_m	1.1847	0.878*	1.1453	0.9152	-0.2695	1.195	0.7056*	0.883	0.8958	-0.2992**
	β_{IMV}	-0.4884	-0.2151	1.8963	2.2185	2.7069	-0.0798	-0.1829	2.1945	1.7769	1.8567**
L2: Turnover Rate											
Non-April	$\propto$	0.007**	0.0115***	0.0093***	0.0116***	0.0046**	0.0063*	0.0075**	0.0083***	0.0064**	0.00
	β_m	1.2109***	1.1384***	1.1321***	1.1305***	-0.0804***	1.1347***	1.0412***	1.1179***	1.0523***	-0.0824***
	β_{IMV}	-1.3644***	-0.665***	1.1631***	1.1852***	2.5496***	-1.4379***	-0.7378***	1.3132***	1.2106***	2.6485***
April	$\propto$	0.0381***	0.0403***	0.0402***	0.0382***	0.0001	0.0344*	0.0214	0.0162	0.0268	-0.0075
	β_m	1.4296	0.8085*	1.0879	0.9986	-0.431**	1.2445	1.2887	1.2119	1.1959	-0.0486
	β_{IMV}	0.003**	0.1375	2.3608**	1.7756	1.7726*	-0.2152	0.1253	2.2257	2.1325	2.3477
L3: Relative (Quoted) Spread											
Non-April	$\propto$	0.0014	0.0014	0.00	0.0055*	0.0041*	0.0011	0.0008	0.0001	0.0034	0.0023
	β_m	1.154***	1.1267***	1.1558***	1.2132***	0.0591**	1.0338***	1.0326***	1.0265***	1.0527***	0.0189
	β_{IMV}	-0.4061***	-0.0401	1.6324***	2.4633***	2.8695***	-0.3319**	-0.1246	1.7074***	2.2878***	2.6198***
April	$\propto$	0.0108	0.0283***	0.0229**	0.0288*	0.018	0.0067	0.0192	0.0002	0.0315**	0.0247**
	β_m	1.198	0.9114	1.0304	1.0236	-0.1743	1.0358	1.0094	1.1168	0.8522	-0.1836
	β_{IMV}	-0.3813	-0.2626	2.1211	1.9913	2.3727	-0.2874	-0.0862	2.0667	1.8991	2.1865
L4: Amihud Illiquidity Ratio											
Non-April	$\propto$	0.0023	0.0008	-0.0001	0.0059**	0.0036	0.00	0.0027	0.0013	0.0065**	0.0065***
	β_m	1.1293***	1.1304***	1.0625***	1.1814***	0.052*	1.0356***	1.0518***	1.0185***	1.0206***	-0.0149
	β_{IMV}	-0.265***	-0.0126	1.9098***	2.4811***	2.7462***	-0.2656**	-0.1685	1.8074***	2.1923***	2.458***
April	$\propto$	0.0166	0.02*	0.0137	0.0207	0.004	0.0005	0.0027	-0.0103	0.0194	0.0189
	β_m	1.165	1.0406	1.0399	1.2095	0.0445	1.2037	0.8885	1.2906	0.8329	-0.3708**
	β_{IMV}	-0.568	-0.0333	1.9201	2.166	2.734	-0.0906	0.4047	3.0874***	1.9737	2.0643

Note: (i) Statistical level of significance at 1%, 5% & 10% is indicated by ***, ** & * respectively. (ii) Statistical significance of alpha and beta coefficients for April represents the significance of differential slope and beta coefficients in dummy variable regression