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Stock market and its liquidity: Evidence from ARDL bound testing approach in the Indian context

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Abstract: This paper attempts to capture the relationship between stock market movements and its endogenous liquidity measures using Autoregressive Distributed-lag (ARDL) Bounds Testing Approach. We consider depth, breadth, tightness, immediacy and resiliency dimensions of market liquidity using suitable liquidity measures (proxies). Findings suggest that multidimensional liquidity measures like the volume of trade, spread, market efficiency coefficient, turnover rate, trading probability, and the stock market index are in a long-term relationship. While trading activity and market efficiency coefficient affect stock market positively, the negative impact is seen in the case of spread. The liquidity measures affect the stock market in the short run as well. We find that impact of the turnover rate on the stock market is negative in short-run but positive in the long-run. The

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PUBLIC INTEREST STATEMENT

The paper investigates the relationships between stock market index and its liquidity measures like volumes of trade, resiliency (measured by market efficiency coefficient), turnover rate, spread and trading probability. Employing Autoregressive Distributed-lag (ARDL) Bounds Testing Approach to test for cointegration and supplement it with causality tests, confirm evidence of long term and short-term relationships between the stock market movements and its liquidity measures. ARDL is used to avoid the need for the same lag length of all variables as needed in other models. While trading activity and market efficiency coefficient affect stock market positively, the negative impact is seen in the case of spread. Model stability is confirmed using CUSUM tests. The findings suggest policymakers need not to make short-term regulatory changes to maintain the health of the stock market.

findings are important for investors and the market participants as well who pursue loss minimization strategies. The results indicate that short-term policy interventions need not get more important than the long-term objectives of market reforms.

Subjects: Econometrics; Finance; Investment & Securities; Business, Management and Accounting

Keywords: stock market; liquidity; ARDL; market efficiency coefficient; spread; turnover rate

JEL classification: C22; G10; G12

1. Introduction

Liquidity is a fundamental idea in the financial world and is without an all-inclusive definition. For a financial asset, it is commonly explained as the ability of an asset to trade quickly without price distortion. A stock market is considered as a liquid market when it has numerous buy and sell orders at various prices, the cost of transactions is minimal, and price volatility is low. Liquidity is a multidimensional concept and is often judged or measured by different proxies in different financial markets. Sarr and Lybek (2002) argued for five dimensions of liquidity: tightness (looks for transaction costs and other inherent costs of trading), immediacy (efficiency in order settlement), depth (existence of considerable number of orders both above and below the current trading price), breadth (orders in large volumes) and resiliency (speed of price and order adjustment). However, these dimensions are often overlapping and the proxies used in the empirical literature to capture them often measure one with the support of another or in the presence of another dimension. Therefore, the effect of any single dimension of liquidity is often elusive although liquidity is an important consideration in the financial market and asset pricing research. When liquidity is uncertain, the execution of the order, as well as the execution price, is uncertain. Under such uncertainty, the investors would claim a premium for taking the risk, generally termed as liquidity premium in financial literature. This spawned researchers to explore the relationship between asset returns and its liquidity.

In view of its economic liberalization coupled with strong economic growth, capital market reforms, growing stock market size, and increased Financial Institutional investors interest, Indian stock market appears to be an interesting choice for examining the nexus between in stock market movements and its liquidity measures. There are very few studies that attempt to capture the dynamics between the stock market and its liquidity measures. While earlier studies focused on the US and other developed markets, India, an emerging nation with second largest numbers of listed companies next only to the US with its own idiosyncrasies and structural issues may provide a different insight for trading strategies and policy interventions. This is one of the earliest attempt to explore the cointegration and causal relationship between the stock market liquidity with stock market movements in the Indian context. While the existence of liquidity premium in asset returns is well accepted, the possibility of a bidirectional relationship between stock return and liquidity cannot be ruled out. Under the sequential information arrival model, Copeland (1976) and Jennings, Starks, and Fellingham (1981) emphasizes that the new information does not disseminate to all market participants at the same time. Therefore, lagged trading volume contains information that is useful in predicting current stock return and lagged stock return contains information that is useful in predicting current trading volume. Here we extend this notion to all dimensions of liquidity.

Research linking market or aggregate liquidity and returns are relatively less while cross-sectional studies of individual assets are popular. Chordia, Roll, and Subrahmanyam (2001) argue that stock market returns, as well as its volatility, affect trading activity and spread measures of liquidity. Chordia, Roll, and Subrahmanyam (2002) evidence that market returns are affected by order imbalances while order imbalances itself reduces liquidity. Intuitively, price and quantity (volume) is the core of any market interface. Trading volume is often used to measure liquidity, and it has some power in explaining the cross-sectional variances in returns (Lo & Wang, 2000). However, the trading volume changes may be a consequence of order imbalances which may have been generated by information asymmetry among the traders. This may have a temporary or a permanent effect on the prices thus affecting returns. In line with Sang-Gyung, Marathe, and Shawky (2003), we argue that market liquidity and stock return is critical because it leads us to the debate whether liquidity is a priced factor in emerging equity markets like India. The supply and demand forces determine the liquidity of markets as well as of individual assets. While liquidity of an individual asset is influenced by firm-specific characteristics, systemic factors like legal, political as well as macroeconomic factors play a significant part in influencing the liquidity of equity markets. While the stock market index and the liquidity parameters of the same market move through time, we test the hypothesis that there is a statistically significant connection between the changes in stock market index (returns) and its liquidity parameters by testing for the existence of a cointegrated combination of the multiple series while avoiding the problems associated spurious correlation. We believe a stable long-run relationship between stock market returns and its liquidity measures exists for a stable market microstructure and they cannot wander too far from each other (cointegrated). In case the return and liquidity parameters are not in long-run equilibrium, price and liquidity shocks may affect investor behaviour, and they may turn towards liquid assets (Kim & Wei, 2002). We argue that in the absence of cointegration, investors may move towards more liquid markets and the capital will flow in similar direction disturbing and potentially destabilizing the existing market microstructure. Besides, cointegration may form the basis of the pair trading strategy where pricing includes a liquidity risk premium. We also look for the causality between the liquidity measures and stock market return in an attempt to capture the short-run dynamics along with the long-run relationships.

The rest of the paper is structured as follows: a relevant review of literature is presented in section 2 while we explain data and methodology in section 3. In section 4, the results are analyzed, and section 5 concludes the paper.

2. Literature review

The literature on liquidity is vast and varied. Since liquidity has many dimensions, several authors have tried to capture the liquidity dynamics using various proxies. Here we discuss relevant literature on measures to capture liquidity and empirical evidence on the relation between returns and liquidity.

The hypothesis that expected stock return increases with illiquidity has been supported by many authors (Amihud & Mendelson, 1986; Brennan & Subrahmanyam, 1996). Their argument was based on evidence that the bid-ask spreads explain some of the cross-section of expected returns. Amihud et al. (2015) highlighted international evidence on commonality in the illiquidity premium.

A negative relationship between liquidity and expected return is evidenced using stock turnover as a measure of liquidity in Haugen and Baker (1996), Datar, Naik, and Radcliffe (1998) and Chordia et al. (2001). Similar findings with Trading volume was observed by Brennan, Chordia, and Subrahmanyam (1998). Amihud (2002) argued for a positive relationship between expected market illiquidity and expected stock excess return, using a measure that captures the lack of liquidity by dividing daily return by daily dollar volume. Developing a liquidity measure that considers price variations induced by order flows, Pastor and Stambaugh (2003) conclude that market liquidity is an essential factor is pricing common stocks. Korajczyk and Sadka (2008), Hasbrouck (2009), and others test the pricing of both spread and price impact measures in the US while Bekaert, Harvey, and Lundblad (2007) examine the measures in emerging markets like Argentina, Brazil, Chile, Colombia, Greece, India, Indonesia, Korea, Malaysia, Mexico, Pakistan, Philippines, Portugal, Taiwan, Thailand, Turkey, Venezuela and Zimbabwe where liquidity concerns are more pronounced. Using bivariate VAR model for returns and liquidity, Bekaert et al. (2007) they found that residual autocorrelation coefficients are highest for India among the sample countries and finally concluded that unexpected liquidity is positively correlated with returns in all the sample countries. While Korajczyk and Sadka (2008) evidenced that liquidity is priced across the cross-section of assets, Hasbrouck (2009) observed that the effective cost of trading is positively related to US stock return. Bekaert et al. (2007) observed that stock market liquidity is an essential factor in determining stock returns in emerging markets. For resiliency, Hasbrouck and Schwartz (1988) proposed the Market Efficiency Coefficient (MEC) that aims to distinguish short-term from long-term price changes. They expected that the prices of assets with high market resilience to exhibit lower volatility (less transitory changes) between periods in which the equilibrium price is changing. Using Hawkes point process, Large (2007) quantified resiliency dimension of liquidity using time and speed of order book replenishment. Goyenko, Holden, and Trzcinka (2009) observed that effective and realized spreads perform well in capturing liquidity.

The relationship between stock returns and liquidity has been empirically tested in many studies, but the evidence are inconclusive. In a comprehensive survey, Chordia et al. (2001) used NYSE aggregate market spreads, depths, and trading activity and concluded that market returns and its volatility influence market liquidity and trading activity. They argued for a decrease in liquidity when the market moves in the downward direction. Chordia et al. (2002) evidenced that order imbalances not only decrease liquidity but affects market-wide returns as well. Using turnover ratio, trading value and the turnover–volatility multiple, Sang-Gyung et al. (2003) evidenced a positive correlation between stock market returns and its liquidity in 27 emerging nations including India. They also evidenced that market liquidity in India, and a few other nations improved from 1992 to 1999. Acharya and Pedersen (2005) identify the effect of liquidity in an augmented Capital Asset Pricing model. They argued that stock return not only depends on the liquidity level but also on the covariances between the security's return and liquidity with the market liquidity factor. The empirical studies also observed that the relationship between returns and liquidity might be perplexed due to the possible positive association between idiosyncratic risk and illiquidity measures (Spiegel & Wang, 2005). Empirical research on stock markets in Japan (Faff, Chang, & Hwang, 2010) and in China (Narayan & Zheng, 2011) indicates a negative relationship between stock liquidity and stock return. Narayan and Zheng (2011) also observed that the strength of the relationship varies across markets and is stronger on the Shanghai stock market than in the Shenzhen stock market. In allied studies, Petkova, Akbas, and Armstrong (2011) argued for a positive association between the volatility of liquidity and expected returns in US stock exchanges which contradicts the evidence of Chordia et al. (2001). Regarding the nature of the relationships, Köksal (2012) argued that spreads are L-shaped while returns and volume of trades follow a U-shaped pattern. Köksal (2012) evidence that low depths are accompanied by large spreads and vice versa indicating that traders use spreads and depths simultaneously to carry out their strategies. The findings complement the arguments of Amihud, Mendelson, and Pedersen (2005) that a concave relationship exists between stocks' excess monthly returns and bid-ask spreads due to the clientele effect.

In India specific liquidity related studies, Kumar (2003) used impact cost as a proxy for liquidity and finds that the majority of the variation in liquidity can be attributed to inventory cost and adverse selection risk. Gupta, Metia, and Trivedi (2004) document some impact of options expiration on the trading volume on the expiration days. Krishnan and Mishra (2013) reported that volume and spread related to liquidity measures are U-shaped with weak evidence of commonality. The impact of Foreign Institutional Investments on stock market liquidity was found to be negative by Prasanna and Bansal (2014).

Potential relations between asset returns and liquidity have been studied using OLS regressions, SVAR models and in some cases panel cointegration tests (González-Rozada & Levy-Yeyati, 2006). In stock market-related studies, El-Wassal (2005) observed the long-term relationship between stock market liquidity and stock returns in India, Korea, Malaysia, Philippines and Zimbabwe using Johansen Cointegration and Granger Causality tests. Bhattacharya, Sengupta, Bhattacharya, and Roychoudhury (2016) evidenced that liquidity plays an important role in explaining Indian stock market returns. They also highlighted that aggregate stock market liquidity is higher in National Stock exchange than in the older Bombay Stock exchange. Employing panel cointegration, Rahman and Mustafa (2017) argued that Stock market turnover contributes significantly to stock market returns. In this study, we focus on Indian stock market and explore for a long-term relationship between stock market liquidity and returns using ARDL-bounds testing approach which improves over the methodology of Rahman and Mustafa (2017) by mitigating the potential endogeneity problems.

3. Data and methodology

BSE 500 composite index was chosen as the representative of the stock market as it has a representation of various types of enterprises which have wide ranges of market capitalization. Five different liquidity measures have been considered here so that effects of various dimensions of liquidity like market depth, breadth, tightness, immediacy, and resiliency on the stock market may be reviewed. Use of turnover rate as a measure of liquidity is well-supported in Amihud and Mendelson (1986) and Datar et al. (1998). We calculate the turnover rate as the value of all traded stocks of the index divided by market capitalization and use it along with the volume of trade that captures the presence of abundant participants and transactions. We use Market efficiency coefficient (MEC) of Hasbrouck and Schwartz (1988) in an attempt to quantify the effect of execution costs on price over a short period. Therefore, it distinguishes between temporary and permanent price changes and helps in understanding a resilient market. MEC is calculated as $MEC = \frac{\text{Long period log return variance}}{T \times \text{Short period log return variance}}$. We considered 30 trading days as long period and 5 trading days as short period and thus T equals 6 for our study. Resilience is approximated by MEC when MEC approaches 1 but is less than 1. Following Narayan and Zang (2011), we calculate Trading probability as 1/(1 + the number of non-trading days in a month) which captures the speed dimension of liquidity.

Bid-ask spread is popularly used to measure the transaction costs associated with the trade. However, Sarr and Lybek (2002) argued that as a liquidity measure, it is more suitable for over the counter trades and for foreign exchange markets and bond markets. We consider here spread as the high/low ratio of the index during a trading day. Corwin and Schultz (2012) showed that high to low ratio reflects the bid-ask spread as well the variance (volatility). Hence, the spread serves us not only as a measure of liquidity but takes care of volatility as well. Volatility may impact liquidity as it increases the scope for speculative activities at least in the short term (Chordia et al., 2001). Using monthly data from Bloomberg, we construct all the variables for the period July 2002 to June 2016. The BSE500 index plot is presented in Figure 1.

All the variables are tested for stationarity using Unit root tests. Then, we check for cointegration that looks for a long run equilibrium relation towards which the selected time series tend to revert.

Figure 1. BSE 500 index during the study period.

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To alleviate the issue of a priori specifications of the order of integration of the variables required in the traditional cointegration methods, we consider the likelihood of cointegration using ARDL bound tests as proposed by Pesaran, Shin, and Smith (2001).

The ARDL representation allows asymmetric choice of lag lengths to each variable, contrasting other methods of cointegration that needs similar lag lengths for all variables. An additional feature of this model is that it estimates for both long run and short run parameters.

The test is performed using the F-statistics or Wald test to check the significance of the lagged co-efficient in the un-restricted correction model (UECM). The ARDL approach is more robust and performs better for small sample sizes compared with other cointegration techniques (Pesaran and Shin, 1999).

Precisely, an ARDL is a least squares regression containing lags of the dependent and explanatory variables. A generic ARDL $(p, q_1 \ldots\ldots q_k)$ model may be written as:

$$y_t = \alpha + \sum_{i=1}^{p} \gamma_i y_{t-i} + \sum_{j=1}^{k} \sum_{i=0}^{q_j} X_{j,t-i'} \beta_{j,i} + \varepsilon_t \quad (1)$$

where p is the number of lags of the dependent variable and q_j is the number of lags of the jth explanatory variable.

In our ARDL model, we used all dynamic regressors, allowing the dependent variables to have non-zero lagged terms. The explanatory variables (X_j) used in the ARDL model are trading volume (BSE_LNTV, up to lag 4); MEC (BSE_MEC, up to lag 1,); spread (BSE_SP, up to lag 9); trading probability (BSE_TP, up to lag 8) and turnover (BSE_TR, up to lag 4). y_t is the BSE 500 index value at time t in logarithmic form. The selection of the model and the lag length is as per the Akaike info criterion (AIC).

The Error Correction specifications incorporating long and short-run information in the above ARDL (4, 4, 1, 9, 8, 4) model for cointegration is tested as given below:-

$$\Delta y_t = \sum_{i=1}^{p-1} \gamma_i{}^{*} \Delta y_{t-1} + \sum_{j=1}^{k} \sum_{i=0}^{q_j-1} \Delta X_{j,t-i'} \beta_{j,i*} + \alpha ECT_{t-1} + \varepsilon_t \quad (2)$$

Here y_t represent the dependent variable BSE 500 indices and X_j represents the explanatory variables, p and q_j are the number of lags as stated above. The term ECT is the speed of adjustment parameter and shows how much of the disequilibrium is being corrected. We expect a negative coefficient below 1 as a negative coefficient indicates convergence while a positive value means explosive and is unreasonable.

Following Pesaran et al. (2001) and using Equation (2), we transform the above equation into

$$\Delta y_t = \alpha + \sum_{i=1}^{p-1} \gamma_i{}^{*} \Delta y_{t-1} + \sum_{j=1}^{k} \sum_{i=0}^{q_j-1} \Delta X_{j,t-i'} \beta_{j,i*} + \rho y_{t-1} + \sum_{j=1}^{k} X_{j,t-i'} \delta_j + \varepsilon_t \quad (3)$$

The test for the existence of long-term relationships is to test for the null hypothesis of the nonexistence of a long-run relationship in Equation (3) is H_o: $\delta_1 = \delta_2 \ldots\ldots = \delta_k = 0$

The hypothesis is tested using F-statistic (Wald test) whose significance is tested using lower and upper bound critical values of Pesaran et al. (2001). The lower critical bound signifies that there is no cointegration among the underlying variables and the upper critical bound is indicative of the presence of cointegration among the underlying variables. When the calculated *F*-statistic is more than the upper bound critical value, we reject the null hypothesis of no cointegration, and if the value is less than the lower bound critical value, the null hypothesis of no cointegration cannot be

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rejected. Inconclusive results are inferred when the calculated *F*-statistic is within the lower and upper bound critical values.

4. Data analysis and findings

Initially, all the variables are tested for stationarity using Augmented Dickey–Fuller test and Philip Perron test. While two liquidity measure (volume of trade and turnover rate) are integrated of order one, the others have zero order of integration. This is in line with the arguments of Pesaran et al. (2001) that variables for ARDL bound test should be either I(0) or I(1). Then we apply the ARDL testing procedures to estimate the long run relationship. We estimate the Equation (3) using the OLS method and computed F statistics along with the critical values from Pesaran et al. (2001) at different levels of significance are presented in Table 1 below:

Table 1 presentations the F statistic computed based on the Wald test. The calculated F-statistic value in Table 1 exceeds the above the upper bound rejecting the null hypothesis of the absence of cointegration. Hence, we infer that cointegration exists between liquidity parameters and the stock market, i.e., a long-term relationship exists between them. It means that the liquidity measures and the stock market co-moves and they cannot disperse very far from each other independently. Next, we capture the estimates from equation 4 using the ARDL cointegration technique and present long-term estimates in Table 2 and short-term estimates in Table 3.

The findings from Table 2 indicates the strong long-run relationship between liquidity measures and the stock market. The values of the long run coefficients indicate that contemporary trading volume, market efficiency coefficient, spread and turnover rate are significant at or under 5% level of significance in influencing BSE500 index, i.e., the explanatory variables affect the stock market in the long run. For example, the coefficient of trading volume indicates that 1% change in the trading volume (in logarithmic form) causes 0.586% change in the BSE500 index (in logarithmic form). The result shows a diminishing impact of trading volume on stock market movement.

Table 1. ARDL bound test: for a long-run relationship

Ho: No cointegration	Value	5% Critical bounds		1% Critical bounds	
		I(0)	I(1)	I(0)	I(1)
Computed F statistic	5.458	2.39	3.38	3.06	4.15

Source for critical value: Pesaran et al. (2001). The computed F value is well beyond the critical values at 1% level of significance indicating a long run relationship.

Table 2. Long-term estimates

The dependent variable is the natural logarithm of BSE500 index			
Regressor	**Coefficient**	**t-Statistic**	**Prob.**
Trading Volume	0.586	5.611	0.00
Market efficiency coefficient	0.488	2.493	0.01
Spread	−5.412	−3.746	0.00
Trading Probability	−0.425	−1.835	0.06
Turnover Rate	5.295	2.052	0.04
Constant	5.627	1.085	0.2799

The table shows all the long run estimates are significant in explaining the dependent variable. While trading volume, market efficiency coefficient and spread are significant at 1% level of significance, the turnover rate is significant at 5%level of significance. Trading probability is significant at 10% level of significance.

Table 3. Short run estimates

The dependent variable is the natural logarithm of BSE500 index			
Regressor	**Coefficient**	**t-Statistic**	**Prob.**
ΔTrading Volume	0.170142	5.797746	0.0000
Δ Market efficiency coefficient	0.022214	3.481701	0.0007
ΔSpread	−0.514661	−7.952054	0.0000
ΔTrading Probability	−0.831608	−2.024470	0.0452
ΔTurnover Rate	−1.823375	−3.052039	0.0028
Error Correction Term$_{t-1}$ (ECT)	−0.084761	−6.334929	0.0000

ECT = y + 0.586* Trading Volume +0.488* Market efficiency coefficient—5.412*Spread—0.425*Trading Probability +5.295*Turnover Rate +5.6277)

Turnover rate and market efficiency coefficient also positively impacts the stock market. This positive association between turnover rate and stock market index supports findings of Rouwenhorst (1999), Sang-Gyung et al. (2003) and Dey (2005) indicating that active management of the Indian index may lead to high turnover and growth in its value. The negative coefficient of spread is as per our expectation as higher spread means market frictions are more and therefore the market is less liquid which negatively affects the stock market. The summary of the short run analysis is reported in Table 3.

The findings from Table 3 shows that all the liquidity measures which are significant in the long run analysis are significant in short run analysis as well. The short-run estimates have the same signs as that of long-run estimates except for turnover rate. The turnover rate negatively impacts the stock market in the short run but positively in the long run. The high-cost structure is inherent in the Indian stock market, high turnover indicates higher costs which negatively impacts the stock market in short run but in the longer period, the cost gets absorbed, and the nature of association reverses. These findings are in line with observations of Banerjee and Ghosh (2004) where they observed high cost of transactions in Indian stock exchanges and the turnover rate is negatively related to stock price. The coefficient of lagged error correction term ECT_{t-1} is significant at 1% level of significance and is negative as per our a priori expectation indicating the speed of adjustment towards long-run equilibrium when the system is exposed to a small shock. The results are supportive of the existence of long-run and short-run relationships between stock market and its liquidity parameters. Subsequently, we conduct diagnostic tests and stability tests for our ARDL model. The results of the examination of serial correlation, functional form, normality and hetero-skedasticity associated with the model are presented in Table 4.

The result of the diagnostic tests is presented in Table 4. While Jarque-Bera statistic value of 0.43 indicates normality of the residuals, Ramsey reset test result suggests that the model is well specified. The chi-square values reported in Table 4 indicates that there is no evidence of serial correlation and the residuals are homoscedastic. Finally, we explore the stability of the coefficients of the model using the cumulative sum of recursive residuals (CUSUM), and the cumulative sum of the squares of recursive residuals (CUSUMSQ) tests and findings are presented in Figures 2 and 3 respectively.

The figures suggest that the null hypothesis of stable coefficients of the model cannot be rejected at the 5% level of significance for both CUSUM and CUSUMSQ tests as the cumulated sum stays within the 95% confidence band. The Figure 2 indicates coefficients in the equation are stable within the 5% critical lines while Figure 3 shows that the residual variance is stable as the cumulative sum of the squares is within the 5% level of significance. Supporting model stability,

Table 4. Diagnostic tests for ARDL error correction model

Breusch-Godfrey Serial Correlation LM Test *Null Hypothesis: No serial correlation*			***Inference***
F-statistic	0.913	(0.5368)	The null hypothesis of no serial correlation could not be rejected.
Obs*R-squared (χ^2)	14.396	(0.2761)	
Breusch-Pagan-Godfrey Heteroskedasticity Test *Null Hypothesis: No heteroscedasticity*			
F-statistic	1.244	(0.1928)	The null hypothesis of no heteroscedasticity could not be rejected.
Obs*R-squared (χ^2)	41.542	(0.2071)	
Normality Test *Null Hypothesis: Normal Distribution*			
Jarque-Bera statistic	0.43	(0.81)	The null hypothesis of normal distribution could not be rejected.
Ramsey RESET Test *Null Hypothesis: Functional form is correctly specified*			
t-statistic	1.400	(0.1641)	The null hypothesis of correct functional form could not be rejected.
F-statistic	1.961	(0.1641)	

The figures in parentheses represent the respective p values

Figure 2. Result of CUSUM test.

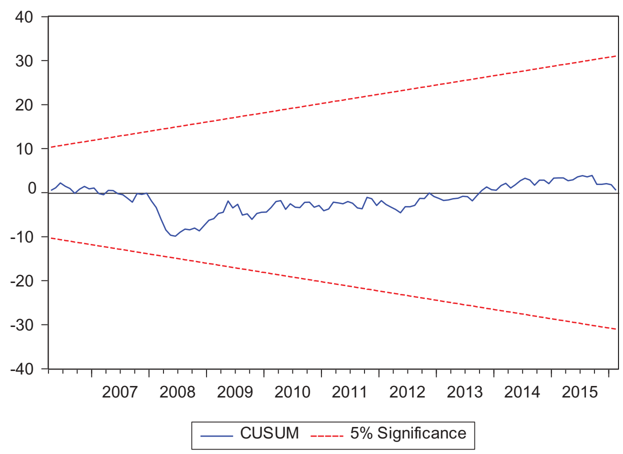
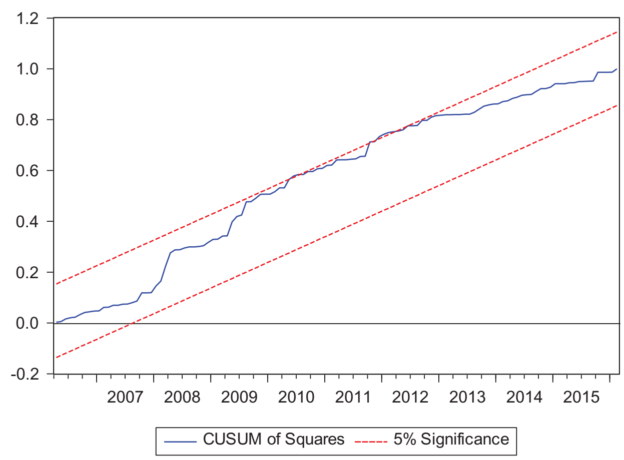


Figure 3. Result of CUSUMSQ test.



the CUSUM plot implies that the model is not misspecified and CUSUMSQ plot complements the findings of the CUSUM plot to suggest no structural change in the model over time.

5. Conclusion

The study delves into the relationship between stock market movements and its endogenous liquidity parameters using ARDL Bounds Testing Approach and concludes that volume of trade, spread, market efficiency coefficient, turnover rate, trading probability, and the stock market index are in a long-term relationship. Using suitable proxies to capture multiple dimensions of liquidity, we show that liquidity plays some role in explaining the movement of the stock market in India in both the long and short run. While trading activity and resiliency affect stock market changes positively in the long run, the negative impact is seen in the case of spread or transaction costs and other costs of trade. The liquidity measures affect the stock market in the short run as well. We find that impact of the turnover rate on the stock market is negative in short-run but positive in the long-run. The findings are important for market participants both in formulating strategy and executing stop-loss orders or other loss minimization strategies where expected changes in liquidity may play an important role. The negative relation between spread and stock market changes is in line with the existing literature on liquidity premiums. The findings support the observations of Datar (2000) that liquidity tracks stock market movements in India. The findings divergences from the evidence of Leirvik, Fiskerstrand, and Fjellvikås (2017) who did not find any relation between market liquidity and return. For policymakers, the low market liquidity may drive up the cost of equity, possibly depressing business investment and economic activity. Evidence of long-term relationship means policymakers need not make short-term regulatory changes to maintain the health of the stock market. The findings suggest that policymakers may look at the liquidity issue seriously and take the technical measures as required to reduce the damage to market liquidity without increasing the risks to financial stability in any significant way.

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