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Economic policy uncertainty and stock market liquidity: Does financial crisis make any difference?

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Abstract

Purpose- This study examines the relationship between economic policy uncertainty and stock market liquidity in an order-driven emerging stock market.

Design/methodology/approach- Empirical estimates are based on vector autoregressive Granger-causality tests, impulse response functions and variance decomposition analysis.

Findings- The empirical findings suggest that economic policy uncertainty moderately influence stock market liquidity during normal market conditions. However, the role of economic policy uncertainty for determining stock market liquidity is significant in times of financial crises. We have also observed a significant portion of variation in stock market liquidity is attributed to investor sentiments during financial crises.

Originality/value- This study is original in nature and provides evidence to consider economic policy uncertainty as a possible source of commonality in liquidity in the context of an emerging market.

Keywords: Economic policy uncertainty, Emerging market, Investor sentiment, Stock market liquidity, Vector auto-regression (VAR) model.

JEL Code: E44, E52, G18

1. Introduction

Stock market liquidity is one of the most debatable topics in the recent literature on economics and finance. It has attracted enormous attention of academic researchers and practitioners for two fundamental reasons. First, liquidity is instrumental for hedging and risk management, asset pricing, determination of cost of capital and efficient capital allocation (Acharya and Schaefer, 2006; Amihud and Mendelson, 1986; Borio, 2004; Brunnermeier and Pedersen, 2009; Chordia et al., 2000, 2008; Das and Hanouna, 2009; Wang, 2013). Second, the potential impairment caused by lack of liquidity during financial crisis and uncertain market condition. Therefore, it is essential to study the dynamics of stock market liquidity and its determinants. Related literature has documented that market microstructure variables, macroeconomic variables, firm-specific characteristics, behavioral factors and investor sentiment are significant determinants of stock market liquidity. (Chordia et al., 2000; Goyenko and Ukhov, 2009; Liu, 2015; Kamara et al., 2008; Moshirian et al., 2017; Massa, 2004; Naes et al., 2011; Soderberg, 2008; Taddei, 2007). Besides, in the wake of global economic meltdown, another strand of literature has largely discussed on the effect of economic policy uncertainty (EPU) on various economic units such as growth, investment, output, productivity, consumption and stock market performance (Bachman et al., 2012; Bhagat and Obreja, 2013; Bhagat et al., 2016; Brogaard and Detzel, 2015; Friedman, 1968; Gilchrist et al., 2014; Gulen and Ion, 2012; Rodrik, 1991). Available research work on EPU and stock market performance indicators has mostly concentrated on either the impact of EPU on stock market volatility or stock market return (Antonakakis et al., 2013; Bhagat et al., 2016; Dzielinski, 2012; Kang and Ratti, 2013; Ozoguz, 2009; Pástor and Veronesi, 2012, 2013). However, the literature connecting EPU and stock market liquidity is scant, despite of the fact that the sudden dry-up of liquidity from the stock market (Fernández-Amador et al., 2013) and the steep increase in economic policy uncertainty (Bloom, 2014) during financial turmoil are two promising issues of the recent literature.

There are competing reasons for why EPU may be related to stock market liquidity. Market microstructure literature suggests that traders provide liquidity to the market (Brunnermeier and Pedersen, 2009; Hasbrouck, 2007; O'Hara, 1998), and that depends on how economically they can finance their assets. An increase in policy uncertainty is likely to increase cost of capital and make the investment costlier (Bhagat et al., 2016; Gilchrist et al., 2010; Fernández-Villaverde et al., 2015). Due to the higher borrowing cost, traders will be reluctant to take on positions, particularly in capital intensive securities, and the trading activity gets hampered. A decrease in trading activity shrinks stock market liquidity (Datar et al., 1998). Further, Copeland and Galai (1983) provide evidence of an inverse relationship between stock liquidity and stock volatility. This indicates that a stock with higher return volatility possesses a lesser degree of liquidity. Subsequently, the positive impact of economic policy uncertainty on stock volatility (Baker et al., 2015; Pástor and Veronesi, 2013) compels us to believe that EPU and stock liquidity might be related. Notwithstanding with such facts, an existing body of literature has documented that the uncertainty pertaining to social, political or economic conditions considerably influence investor sentiment in risky market (Knight, 1921; Price & Tewksbury, 1997; Shiller, 2005). Furthermore, it is evident that investor sentiment can affect stock market liquidity, either in a direct way by causing more noise trading (Baker and Stein, 2004; DeLong et al.,1990; Huberman and Halka, 2001) or in an indirect manner by indicating the higher overconfidence level in the market (Gervais and Odean, 2001; Griffin et al., 2007; Statman et al., 2006). The recent empirical work of Liu (2015) validates the theoretical proposition and documents a positive impact of investor sentiment on stock market liquidity for the US stock markets. From these arguments, we can postulate a relationship between EPU and stock market liquidity.

Moreover, the performance of stock market is a leading indicator of an economy (Levine and Zervos, 1998). One of the primary objectives of capital market is the efficient allocation of scarce resources among existing investment alternatives (Billmeier and Massa, 2009; Caporale et al., 2004; Cooray, 2010). The allocation efficiency is closely tied with operational and informational efficiency. When information asymmetry is high, the volatility of stock market is likely to shoot up and increase transaction cost due to adverse selection problem (Akerlof, 1970). Higher transaction cost impedes stock market activity and lower down its performance. This may create negative sentiment among market participants, which leads to higher uncertainty in the market (Bloom, 2014). As well, any sudden changes in existing economic policy or in the political spectrum may be vulnerable for the prevailing market uncertainty. For example, when central bank squeezes money supply, the funding liquidity of investors gets affected (Brunnermeier and Pedersen, 2009). From this news, investors perceive a higher borrowing cost and become pessimistic about the future prospect of their investments. This discourages them to actively take part in trading and fuel the prevailing uncertainty in the market. Pástor and Veronesi (2011) posit that public policy which is unclear and hyperactive may create huge uncertainty during economic downturn. These competing arguments enable us to hypothesize a relationship between stock market liquidity and EPU.

The focus of this study is to examine the relationship between EPU and stock market liquidity in India. Considering India as an ideal candidate is compelled by the following reasons. First, there is a dearth of research testing the relationship between EPU and stock market liquidity in developed as well as emerging economies. Mostly, the existing studies on EPU and stock market performance are concentrated on either finding out the impact of EPU on stock market return or stock market volatility (Antonakakis et al., 2013; Chuliá et al., 2017; Chen et al., 2016; Kang and Ratti, 2013, 2015; Pástor and Veronesi, 2012). Second, there are merits of conducting the study in India, as it is an order-driven emerging market. Each emerging market economy is considered to be unique with its own market structure, regulatory environment and levels of market development (Bekaert and Harvey, 2003). Emerging economies are more prone to uncertainties as they have less effective monetary and fiscal policy, and high dependence on import of volatile goods like rubber, copper and oil (Bloom, 2014). Apart from that, order-driven markets have substantially different market microstructures and their behavior is different from quote-driven or hybrid markets (Brockman and Chung, 2002; Ma et al., 2016). Since financial liberalization, the Indian capital market has made remarkable progress in terms of the market size and liquidity. The size of Indian stock market (market capitalization to GDP ratio) has risen from 17.83 percent in 1991 to 72.4 percent in 2015 (The World Development Indicator, 2016). In this backdrop, it is worthwhile to understand the relationship between EPU and stock market liquidity using data from an order-driven emerging market like India, which is less correlated with the developed market.

We examine the nexus between EPU and aggregate stock market liquidity in a VAR framework. We conduct VAR Granger-causality test to detect the flow of causality between EPU and stock market liquidity. Impulse response functions analysis is carried out to elucidate the response of each stock market liquidity measure for unit positive shock applied to EPU. Using variance decomposition analysis, we try to figure out the percentage of stock market liquidity explained by EPU. Considering the multidimensional features of liquidity, we have used five different liquidity proxies to measure trading activity, price impact and transaction cost aspects of liquidity. This approach helps to identify which aspects of liquidity may have more prominence for EPU impact. Following existing studies such as Antonakakis et al. (2013), Bhagat et al. (2016), Fernández-Amador et al. (2013), Goyenko and Ukhov (2009), Levine and Zervos (1998), and Soderberg (2008), we have employed the following control variables such as reserve money growth rate, growth rate of industrial production, inflation rate, funds flow from foreign institutional investors, stock market volatility and stock market return in our model. Motivated from the recent findings of Liu (2015), we have included investor sentiment in our analysis. We have constructed an aggregate investor sentiment index by using market related implicit sentiment proxies for Indian market. Further, we carry out Iterative Cumulative Sum Square (ICSS) structural break test of Inclan and Tiao (1994) to indentify the occurrence of any trend break or shift during our study period. Our empirical findings support the relationship between EPU and stock market liquidity, and their relationship is more pronounced during the times of financial crisis.

In light of significance of this issue, we contribute to the existing literature in several ways. First, we establish a relationship between EPU and of stock market liquidity. To our knowledge, the present study is perhaps the first-ever empirical evidence from developed as well as emerging market on the EPU and stock market liquidity relationship. One may claim that the economic policy uncertainty could be one of the possible sources of commonality in liquidity. Besides, most of the existing studies on EPU and stock market performance have overlooked the role of investor sentiment. We fill this gap by using investor sentiment as a variable in our model. A thorough understanding of the relationship between EPU and stock market liquidity may be useful for policy makers to devise mechanism to reduce unnecessary policy uncertainty, so that adequate amount of liquidity should be available for sustenance of financial markets.

The remainder of the paper is organized as follows. Section 2 deals with data and description of variables. Section 3 presents empirical approach. Section 4 discusses empirical results. Section 5 concludes the paper.

2. Data and variables

This section has been divided into two parts. The first part deals with data and sample characteristics. The second part describes variables and their measurement.

2.1. Data and sample characteristics

Our study sample constitutes of stocks listed on the National Stock Exchange (NSE) of India for the period January 2003 to December 2016. The choice of sample period is based on the availability of continuous data for all liquidity proxies, market implicit investor sentiment proxies, macroeconomic variables and EPU index. Also, it helps to avoid any impact of the transition from two different trading systems in the Indian stock market. The Security Exchange Board of India (SEBI) abolished the 'Badla system' in July 2001 and introduced the rolling settlement cycle (T+2) to facilitate transparency, efficiency, and immediacy. Following Chordia et al. (2005), we set the following criteria to select stocks for our study.

(i) The stock is required to be present and should have been continuously traded throughout the sample period (i.e., January 2003 to December 2016).

(ii) The stock should disseminate daily trading information such as open price, high price, low price, closing price, trading volume, number of outstanding shares etc.

(iii) Stocks which were not actively traded in the market are excluded from our sample.

(iv) To avoid the influence of unusually high-priced stocks, we exclude stocks having abnormally high value at the end of any month in a year.

Considering the stock selection criteria mentioned above, we find 510 firms to be included our study sample. We have collected the daily stock's information (i.e., stock prices, volume of trades, number of shares traded etc.) for all selected stocks to determine daily return, daily volatility, and liquidity proxies. Then, the daily measures are averaged out to construct a monthly proxy as most of the macroeconomic variables are available at a monthly frequency. The total number of observations for time series analysis is 168 monthly observations. Stock price and other firm-specific variables are collected from Bloomberg database. The macroeconomic fundamentals data are obtained from the Handbook of statistics published by Reserve Bank of India (RBI). The data pertaining to economic policy uncertainty has been obtained from "Measuring Economic Policy Uncertainty" by Scott Baker, Nicholas Bloom and Steven J. Davis at www.PolicyUncertainty.com.

2.2. Variables

This section deals with description and measurement of liquidity variables, construction of aggregate investor sentiment index, EPU index, macroeconomic variables and stock market related variables.

2.2.1. Liquidity variables

Liquidity, by its very nature, is difficult to measure because it encompasses a number of transactional properties of the underlying asset (Kyle, 1985; Lesmond, 2005). Stock market liquidity has multiple dimensions, such as tightness (the ability to buy or sell a security about the same price), depth (the ability to buy or sell certain quantity of securities without any impact on quoted prices), immediacy (the velocity with which a transaction gets executed) and resiliency, which reflects how quickly asset prices revert to the previous level after a particular quantity of transaction (Kyle, 1985; Sarr and Lybek, 2002). Considering the multidimensional nature of liquidity, we employ five different liquidity proxies to capture various attributes like trading activity, impact cost and transaction costs.

Trading activity is an intuitive and indirect measure of asset's liquidity. Following Fernández-Amador et al. (2013), we use turnover rate (TR) and traded value (TV) as the proxies to measure the trading activity of stocks. TR is measured as the ratio of the number of shares traded to the number of shares outstanding. TV is measured as the product of the number of shares traded with respective stock prices. Higher values of TR and TV exhibit greater liquidity (Brennan et al., 1998; Datar et al., 1998).

The price impact dimension of liquidity is defined as the change in the price of an asset for a unit change in the volume of a transaction (i.e., the response of asset's price to the flow of orders). Following Goyenko and Ukhov (2009), and Fernández-Amador et al. (2013), we have employed Amihud's (2002) illiquidity measure (ILLIQ) and turnover price impact (TPI) to capture the price impact characteristics of stock liquidity. ILLIQ measures the response of return from a stock for every rupee change in trading volume (Amihud, 2002). It serves as a good empirical proxy for determining liquidity and serves the purpose a reasonable measure of price impact among most of the low-frequency liquidity proxies (Goyenko and Ukhov, 2009; Korajczyk and Sadka, 2008; Lesmond, 2005). This ratio can be computed as the absolute return from any security '*i*' (for the month t) ($|R_{i,d}|$)on the traded volume ($TV_{i,d}$), averaged over the number of trading days in that month (D_i).

$$ILLIQ = 1/D_i \sum_{d=1}^{Di} \frac{|R_{i,d}|}{TV_{i,d}}$$

Despite the wide popularity of the ILLIQ measure, it suffers from some fundamental limitations. ILLIQ proxy has a size bias because of small-size stocks are more illiquid than large-size stocks and the value of the ratio might generate ambiguity in cross-sectional studies. Secondly, inflationary forces may also have an impact on this ratio as the trading volumes are measured in monetary units. Reviewing these shortcomings, Florakis et al. (2011) introduced turnover price-impact ratio (TPI) as a simple and adequate measure of stocks liquidity. TPI is measured as the ratio between the absolute return from any security 'i' (for the month t) ($|R_{i,d}|$) to the turnover rate ($TR_{i,d}$), averaged over the number of trading days in that month (D_i).

$$TPI = 1/D_i \sum_{d=1}^{Di} \frac{|R_{i,d}|}{TR_{i,d}}$$

To capture the transaction cost aspect of liquidity, we have employed high-low spread ratio (HLS) of Corwin and Schultz (2012) as a measure of illiquidity. The computation of this ratio requires daily high (reflects trades initiated by buyers), and low (reflects trades initiated by sellers) prices of stocks. Thus, HLS proxy reflects the daily primary stock volatility and spread (bid-ask spread). We calculate HLS ratio as follows:

$$HLS = \frac{2 * (e^{\alpha} - 1)}{1 + e^{\alpha}}$$

where α can be determined as $\alpha = \frac{\sqrt{(2* \beta)} - \sqrt{\beta}}{3-2*\sqrt{2}} - \sqrt{\frac{\gamma}{3-2*\sqrt{2}}}$, $\beta = \sum_{i=0}^{1} \ln\left(\frac{H_{t+i}^{O}}{L_{t+i}^{O}}\right)$ and $\gamma = \sum_{i=0}^{1} \ln\left(\frac{H_{t,t+d}^{O}}{L_{t,t+d}^{O}}\right)$. H^{O}= observed high price of a stock on day *d*, L^{O} = observed low price of a stock on day *d*.

2.2.2. Economic policy uncertainty (EPU)

The economic policy uncertainty can be defined as the uncertainties pertaining to the economic policy makers' decision (Wu et al., 2016). We use the EPU index proposed by Baker et al. (2013, 2016) for India in this study as a measure of economic policy uncertainty. This EPU index is a news-based index, which is constructed by extracting relevant information from seven leading news papers in India such as the Economic Times, the Times of India, the Hindustan Times, the Hindu, the Statesman, the Indian Express, and the Financial Express.

2.2.3. Investor sentiment variable (SENT)

Existing behavioral finance literature suggests that there are two different approaches to measure the unobservable sentiment variable, i.e., survey method and sentiment proxies derived from the selected market statistics. However, there is no uncontroversial and universal proxy for measuring investor sentiment (Baker and Wurgler, 2006). For measuring local investor sentiment (SENT), following the top-down approach of Baker and Wurgler (2006) we construct a sentiment index using seven implicit sentiment proxies. Consistent with related literature (see for e.g. Baker andWurgler, 2006; Brown and Cliff, 2004; Baker et al., 2012 among others), the selected sentiment proxies are advance decline ratio (ADR), put-call ratio (PCR), number of IPOs (NIPO), equity issue in total issue (EITI), dividend premium (DP), fund flow (FF), cash to total assets (CTA), and market turnover (TOV). Considering the theoretical sign of respective sentiment proxies the SENT index can be represented as:

$$SENT_t = ADR_t - PCR_t + NIPO_t + NIPO_t - DP_t + FF_t - CTA_t + TOV_t \quad (1)$$

However, it is likely that each of the sentiment proxy may include a non-fundamental (i.e., irrational) and a fundamental (i.e., rational) component (Brown and Cliff, 2004). We follow the approach of Baker and Wurgler (2006) to orthogonalise each of the sentiment variables using fundamental factors. Specifically we use reserve money growth rate, term spread, inflation growth rate, industrial production growth rate, short term interest rate and FII inflow as macro-economic control variables to orthogonalise our raw sentiment proxies. The error term of the orthogonal equation has been considered as irrational component of the sentiment proxy. After making the sentiment proxies orthogonal to fundamental factors we use principal components analysis for measuring the common variation. The principal component analysis filters out idiosyncratic noise in the orthogonal sentiment measures and captures their common component. We also use the approach of Baker and Wurgler (2006) to capture the relative timing of each orthogonal sentiment proxies for the construction of SENT index. The second principal component having 47 per cent of the sample variance, gives the following measure of our sentiment index:

$$SENT_t = (-0.398)ADR_{t-1} - (-0.025)PCR_{t-1} + (0.557)NIPO_t - (-0.256)DP_t + (0.643)FF_{t-1} - (-0.138)CTA_{t-1} \quad (2)$$

2.2.4. Macroeconomic and market related variables

Following the existing studies (Bhagat et al., 2016; Chordia et al., 2001; Eisfeldt, 2004; Fernández-Amador et al., 2013; Goyenko and Ukhov, 2009; Soderberg, 2008; Taddei, 2007), we have used the rolling twelve-month reserve money growth rate (RM), industrial production growth rate (IP), inflation rate (IR) and net funds flow from foreign institutional investors (FII) as macroeconomic control variables in our study. Considering the effect of market conditions on stock market liquidity (Brunnermeier and Pedersen, 2009; Copeland and Galai, 1983; Hameed et al., 2010), we have included stock market volatility (STDV) and stock market return (RET) as market related control variables in our model.

Figure 1 depicts the trends of stock market liquidity, economic policy uncertainty, investor sentiment and money supply over the period 2002 to 2016. We drive the following inferences from this figure. First, there are number of instances when EPU has reached peaks. For example, the higher level of EPU during 2004 could be attributed to the surprise winning of general election by congress party. It is noteworthy to mention that on the same day, i.e., on 17th May 2004, SENSEX (the benchmark index of the Bombay Stock Exchange of India) registered a fall of 565 points. One of the major uncertain events in the last decade is the Lehman bankruptcy and the subsequent global financial crisis in 2007-08. Noticeably, the stock market performance drastically gone down and foreign institutional investors pulled out their money from market. Besides, the sudden rise of onion price and the fear of rising inflation in 2010, the significant depreciation of Indian rupees against US dollar in 2011-12 are some of the events when EPU has been marked high. From these observations, we can infer a relationship between EPU and stock market performance. Second, the concurrent observation of EPU and stock market liquidity curves demonstrate that the stock market liquidity is less when EPU is high. This indicates that EPU and liquidity moves inversely with each other. Third, the analogous increasing trend of stock market liquidity and money supply corroborate a positive relationship between them. We have also seen an inverse movement of investor sentiment and EPU. This indicates that how promptly investors' react to stock market depends on the prevailing uncertainty in the market.

(Figure 1)

(Table 1)

The summary statistics and correlation matrix of liquidity variables (TV, TR, ILLIQ, TPI, HLS), investor sentiment (SENT) and other control variables (RM, IP, IR, FII, STDV, RET) are presented in Table1. Panel A discusses the descriptive statistics. Panel B reflects the correlation structure among them. The following observations have been derived from the correlation matrix. First, there is a negative correlation between measures of stock market liquidity and EPU. This implies that when economic policy uncertainty is more the stock market becomes less liquid. The positive association of investor sentiment and liquidity reflects that when investor sentiment is high, liquidity of stock market likely to increase. Second, the negative correlation between measures of liquidity (TV and TR) and market volatility (STDV) indicates that the market liquidity goes down with the increase of market volatility. Similarly, the positive correlation between liquidity and return suggest that the liquidity of stock market rises in concurrence with the rise of stock market return. This implies that return is an increasing function of liquidity. Third, the growth rate of reserve money is positively correlated with stock market liquidity. This indicates that an expansionary monetary policy, which is characterised by higher money supply, positively affects increase in aggregate market liquidity. We have also observed a negative correlation between investor sentiment and EPU, which means investors perception towards market changes with respect to the changes in level of uncertainty. Further, our correlation analysis reflects a small degree of association among liquidity measures. This may be due to the fact that liquidity is multidimensional in nature and the employed liquidity proxies measure the different aspects of liquidity and do not represent the same sets of information.

3. Model specification and methodology

This section deals with the econometric models used to analyze the relationship between EPU and stock market liquidity. Besides, we carry out Iterative Cumulative Sum Square (ICSS) break test of Inclan and Tiao (1994) to indentify the occurrence of any trend break or shift during our study period.

3.1. Vector auto regression (VAR) model

VAR model helps to understand the relationship between economic variables by capturing the linear interdependency among the variables (Sims, 1980). Unlike the classical simultaneous equation models, VAR is free from any arbitrary restriction. Sims (1980) highlights that if there exists any simultaneity among the variables, then there should not be any distinction between endogenous and exogenous variables and all variables are considered to be endogenous. Thus, each equation will have the same number of regressors which leads to the development of VAR models. Following Chordia et al. (2005) and Goyenko and Ukhov (2009), we specify the VAR model as follows:

$$X_t = \alpha_1 + \sum_{i=1}^{m} a_{1i} * X_{t-i} + \sum_{i=1}^{m} b_{1i} * Y_{t-i} + u_t \quad (3)$$

$$Y_t = \alpha_2 + \sum_{i=1}^{m} b_{2i} * Y_{t-i} + \sum_{i=1}^{m} a_{2i} * X_{t-i} + v_t \quad (4)$$

where, X vector represents the monthly stock market liquidity measures at time ‘t-i’ and Y vector stands for the monthly measures of economic policy uncertainty and other control variables at time ‘t-i’. Where ‘i’ represents the minimum lag length. a_{1i} and a_{2i} are the coefficients of lagged value of X vector and b_{1i} and b_{2i} are the coefficients of lagged value of Y vector. The u_t and v_t are the error terms of equation (1) and (2) respectively.

In order to choose the optimal lag length m, we have employed Akaike Information Criterion (AIC) and Schwarz Information Criterion (SIC). Although the two criteria show different lag lengths, we have chosen the smaller one to retain maximum number of degree of freedom. Before estimating VAR model, we have carried out Augmented Dickey-Fuller (ADF) (1981), Phillips-Perron (PP) (1988) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) (1992) unit root tests to test the stationarity. This VAR model determines whether stock market liquidity and macroeconomic variables are linked together and any spontaneous change in macroeconomic environment influences stock market liquidity.

Despite the usefulness of the VAR model, it suffers from certain key limitations. First, the involvement of large numbers of parameters in the estimated model makes it difficult to interpret. Second, the sign of the coefficients of lagged variables changes across different lags. That makes it difficult to ascertain the effect of a given change in a variable upon the future values of the variables in the system. To overcome these weaknesses, we use VAR model along with VAR-Granger causality test (Granger, 1969; Sims, 1980), impulse response functions and variance decomposition test. The Granger-causality test enables us to know the direction of causality (unidirectional or bidirectional causality) between stock market liquidity and macroeconomic variables. The impulse response function (IRF) traces the impact of a unit shock applied to one of the endogenous variable on the current and future values of other endogenous variables. In this study, the IRF traces out the response of stock market liquidity for one positive shock applied upon the residuals of macroeconomic variables. This helps to capture the sign, magnitude and persistence of responses of stock market liquidity measures to shocks in macroeconomic variables. Taking cues from literature, we use standard Cholesky decomposition of VAR residuals and place the variables in the order that they influence each other. We further examine the predictability of each macroeconomic variable by employing variance decomposition. Variance decomposition explains the percentage of variation in the dependent variable not only due to its own shock, but also to the shocks in other variables. In our analysis, the variance decomposition explains the proportion of variation in stock market liquidity due to innovations in EPU and other variables.

4. Discussion of empirical results

This section discusses the empirical findings of the relationship between EPU and aggregate stock market liquidity. We have reported the findings of VAR-Granger causality test, impulse response functions (IRF), and variance decomposition analysis. Following the standard procedure, we first check the stationarity of the time series employed in our model by conducting ADF, PP and KPSS unit root tests. The unit root test statistics, as reported in Table 2, reveals that the null of the unit root is rejected for all liquidity measures, EPU and control variables at first difference (with intercept and trend, and without intercept and trend). There are two compelling reasons to use variables in their first difference. First, most of the liquidity variables are stationary at first difference. Second, the use of variables at their first difference is supposed to reduce the problem of serial correlation and trending of data to a larger extent (Wooldridge, 2002). Hence we have reported the unit root test statistics at the first difference only.

(Table 2)

Then, we conduct Inclan and Tiao (1994) structural break test to know whether any sudden shifts or trend break has occurred during the study period. The test results do not document any breaks in the time series. For the purpose of brevity, we have not reported structural break test results.

4.1. EPU and stock market liquidity (for the whole sample period)

This section discusses the empirical results of VAR-Granger causality test, impulse response functions (IRF), and variance decomposition to examine the relationship between EPU and aggregate stock market liquidity for the whole sample period, i.e., January-2003 to December-2016. In this case, we estimate VAR model for five stock market liquidity proxies (TV, TR, ILLIQ, TPI, HLS), economic policy uncertainty variable (EPU) and seven control variables (SENT, RM, IP, IR, FII, STDV, RET). This entails a total of 40 different VAR estimates.

Though we have conducted Granger-causality tests for all the employed endogenous variables, for the sake of brevity, we report only the Granger-causality tests between five liquidity proxies and EPU. We test the null hypothesis that the lagged value of endogenous variable (either EPU or stock market liquidity) does not Granger-cause the dependent variable (again, stock market liquidity or EPU).

(Table 3)

Table 3 reports the χ^2statistics of Granger-causality tests between EPU and stock market liquidity proxies. The estimated results, as shown in Panel (A) of Table 3, reveals that EPU Granger-causes stock market liquidity and the effect is prominent for the price impact dimension of liquidity. However, we do not find much evidence of the influence of EPU on either trading activity or transaction cost dimensions of liquidity. Also, the reverse causality, i.e., stock market liquidity Granger-causes EPU is not evident from this result.

To understand the dynamic interaction among the variables in the model, we conduct IRF analysis. We use standard Cholesky decomposition method keeping in mind the existence of a high correlation between the innovations. Figure 2 demonstrates the response of stock market liquidity (TV, TR, ILLIQ, TPI, HLS) to a unit standard deviation change in EPU, traced forward over a period of 24 months. We have seen an appreciation in stock market illiquidity (ILLIQ, TPI and HLS) for a unit positive shock applied to EPU, and stock market liquidity (TV and TR) seems to decline for unit innovation in EPU. This implies that when economic policy uncertainty is high, the stock market becomes more illiquid. This could be due to the fact that an increase in EPU leads to rise in stock market volatility (Amengual and Xiu, 2014; Antonakakis et al., 2013; Balcilar et al., 2013; Brogaard and Detzel, 2015; Liu and Zhang, 2015), and the increased market volatility translates into lower liquidity (Brunnermeier and Pedersen, 2009; Copeland and Galai, 1983). Also, the uncertainty related to economic policy such as changes in monetary policy, fiscal policy or taxation may considerably influence investors financing decisions. For example, when the central bank suddenly increases interest rate, investors face difficulty to finance their assets due to high cost, and become reluctant to take part in active trading. This in turn, reduces the market trading activity and makes the market illiquid.

(Figure 2)

Furthermore, we carryout variance decomposition to know the percentage of stock market liquidity explained by EPU, investor sentiment, macroeconomic and market related variables employed in the model. For brevity, we have reported the variance decomposition of liquidity variables only. Table 4 presents the variance decomposition of liquidity variables (TV, TR, ILLIQ, TPI, HLS) in five panels. Consistent with Fernández-Amador et al. (2013) and Goyenko and Ukhov (2009), we find that a larger portion of variation in stock market liquidity is attributed to changes in monetary policy and inflation rate. To some extent, the net funds flows from foreign institutional investors also predict variation in stock market liquidity. We gather little evidence of the immediate effect of monetary policy or inflation rate to forecast stock market liquidity, rather the effect is prominent in a lag period.

(Table 4)

6.2. EPU and stock market liquidity (across sub-samples)

Since the global financial crisis of 2007-08, two important issues have been largely discussed and debated in finance literature. The sudden dry up of liquidity in the financial system (Amihud et al., 2005; Chordia et al., 2000), and the economic policy uncertainty and its implications on various economic units (Bloom, 2014). Further, the recent financial crisis has witnessed a lot of changes in macroeconomic environment and variables to stabilize financial market (Trichet, 2010). In this backdrop, it is highly imperative to investigate the nexus between EPU and stock market liquidity during the time of financial turmoil as well as normal market conditions. Despite of the fact that the structural break tests do not document the any trend shift or structural break in our sample period, we further divide our sample period into two parts, i.e., January-2003 till July-2007, and August-2007 till December-2016. The first part of sample period (January-2003 till July-2007) has not seen any major market crisis events. On the other hand, the second part (August-2007 till December-2016) has embraced a series of crises, such as global financial crisis (2007), European sovereign debt crisis (2010), Russian financial crisis (2014) and Chinese stock market crash (2015). We conduct VAR-Granger causality tests, IRF and variance decomposition analysis for both the sub-samples.

(Table 5)

(Table 6)

Table 5 reports the estimated results of VAR Granger-causality tests between macroeconomic variables and stock market liquidity for the sub-sample1, i.e., Jan-2003 to July-2007. The results suggest that EPU Granger-causes stock market liquidity, which is consistent with the results obtained for the entire sample period. We do not find any evidence of the flow of causality from liquidity to EPU, which concludes a unidirectional causality between EPU and stock market liquidity. However, the estimated results of Table 6 (for sub-sample 2) give rise to some interesting observations. We find that EPU significantly Granger-causes most of the stock market liquidity proxies. We perceive that the integration of economies and financial markets around the globe could be one of the probable reasons of EPU and liquidity relationship during market stress. Interestingly, we have observed a flow of causality from illiquidity to EPU. One of the plausible reasons could be that illiquidity is systematic risk factor (Pastor and Stambaugh, 2003; Acharya and Pedersen, 2005) and, during crisis period, it may impede economic growth and creates uncertainty (Levine and Zervos, 1998).

The IRF analysis for both sub-samples is shown in Figure 3 and Figure 4 respectively. Consistent with the findings of entire sample period, we find that EPU negatively influence stock market liquidity and strengthen illiquidity of stock market.

(Figure 3)

(Figure 4)

(Table 7)

(Table 8)

Variance decomposition is carried out across both sub-samples and the estimated results are presented in Table 7 and 8 respectively. The empirical results suggest that monetary policy and inflation rate explain a larger portion of variation in stock market liquidity during normal market condition as well as during financial turmoil to some extent. Besides, the economic policy uncertainty and investor sentiment turn out to be a better predictor of stock market liquidity during financial crises period. One of the plausible reasons could be the changes in investor's behavior during market uncertainty. It is believed that investor reacts to bad news more aggressively over good news when market is uncertain (Williams, 2009). A closer view of the recent global financial crisis and the reaction of FII in Indian stock market provide compelling evidence to know how investor's behavior changes with respect to prevailing market uncertainty. The investment of FII in Indian stock market was $20billion in the beginning of the year 2007-08. Surprisingly, after Lehman bankruptcy, FII pulled out approximately $11.1 billion in the first nine months of the calendar year 2008, which impacted a remarkable increase in the market volatility (IMF Country Report, February 2014). The higher volatility of stock market impedes market trading activity and subsequently dries up liquidity from financial market.

7. Conclusions

This paper examines the relationship between EPU and stock market liquidity over the period Januray-2003 to December-2016 in a pure order-driven emerging stock market India. In order to examine the relationship between EPU and aggregate market liquidity we employ a multivariate VAR model; carry out VAR-Granger causality tests, impulse response analysis, and variance decomposition analysis.

The Granger-causality test suggests that EPU Granger-causes stock market liquidity. However, the effect of EPU is more prominent during the times of financial crisis. Impulse response analysis suggests that an innovation in EPU negatively affect stock market liquidity and strengthen illiquidity of stock market. Variance decomposition reveals a higher percentage of liquidity is attributed to monetary policy and inflation rate during normal market condition. In times of financial market crisis, EPU and investor sentiment are better predictor of stock market liquidity over monetary policy and inflation rate. Therefore, EPU may be considered as a possible source of commonality in liquidity and helpful to understand the liquidity dynamics of the stock market. Our empirical results are relevant for practitioners and policy makers. Market participants in the equity market may increase their liquidity forecast by considering EPU as an important information variable along with other macroeconomic and firm-specific variables. Regulators and policymakers may consider the relationship between stock market liquidity and EPU to reduce unnecessary uncertainties in the market, which can be useful to maintain financial market stability. Also, the information about the current economic policy uncertainty may be helpful for practitioners to gauge and assess the future stock market performance.

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Figure 1: Trends of stock market liquidity, economic policy uncertainty, investor sentiment and money supply over the period 2002-2016.

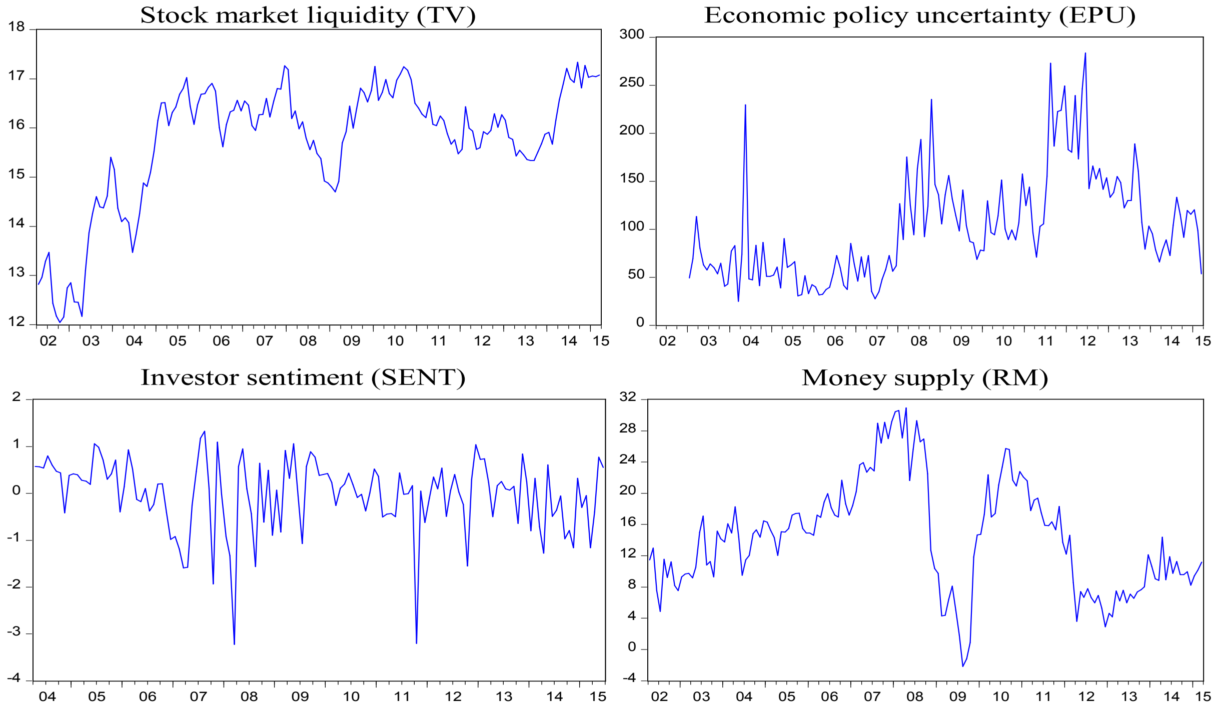

Figure 2: Response of stock market liquidity to unit standard deviation innovation in EPU

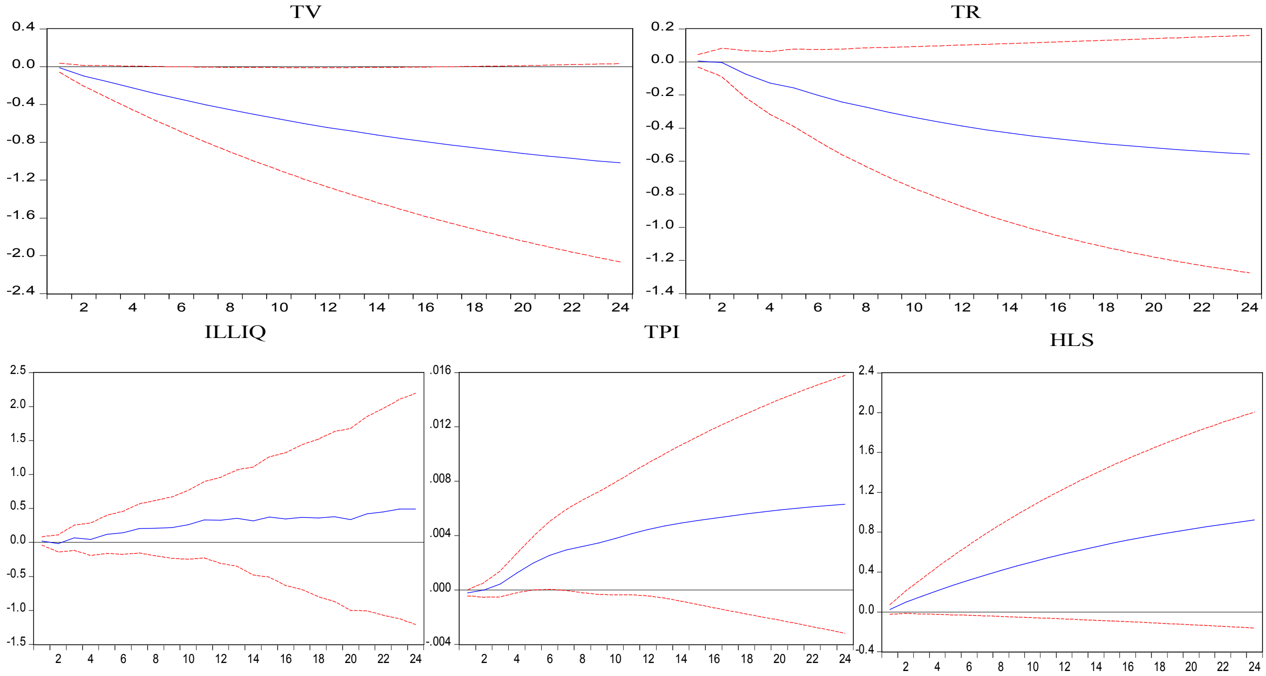

Figure 3: Response of stock market liquidity to a unit standard deviation innovation in EPU for sub-sample 1

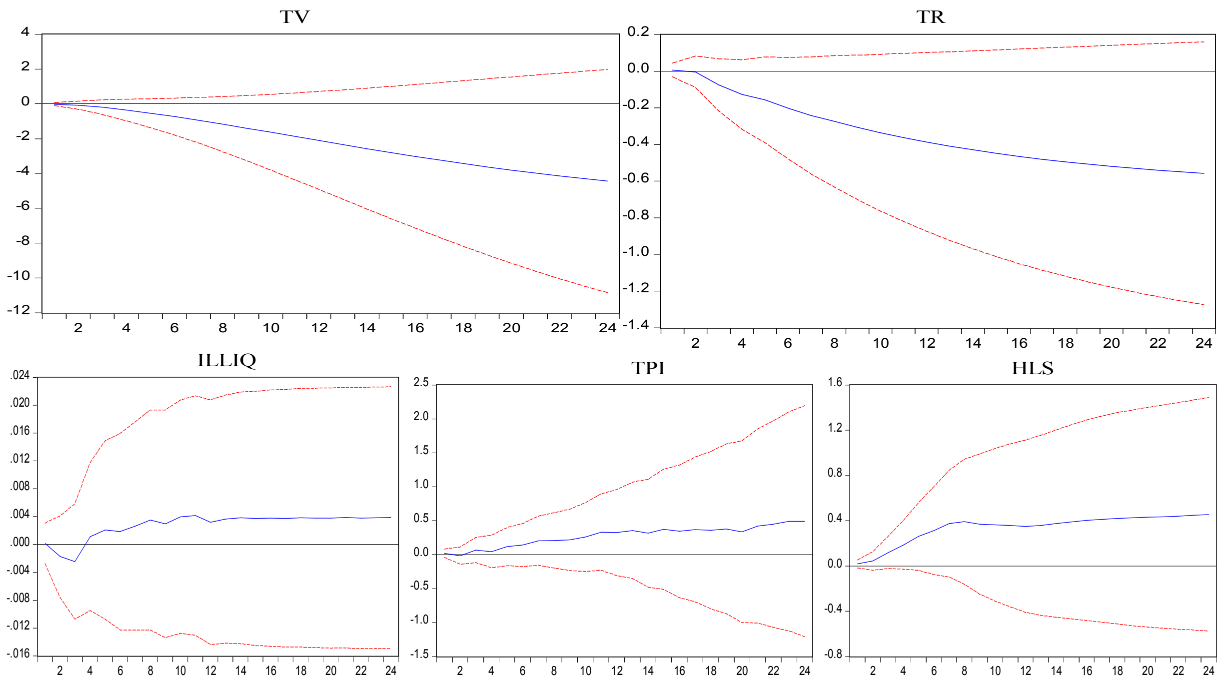

Figure 4: Response of stock market liquidity to a unit standard deviation innovation in EPU for sub-sample 2

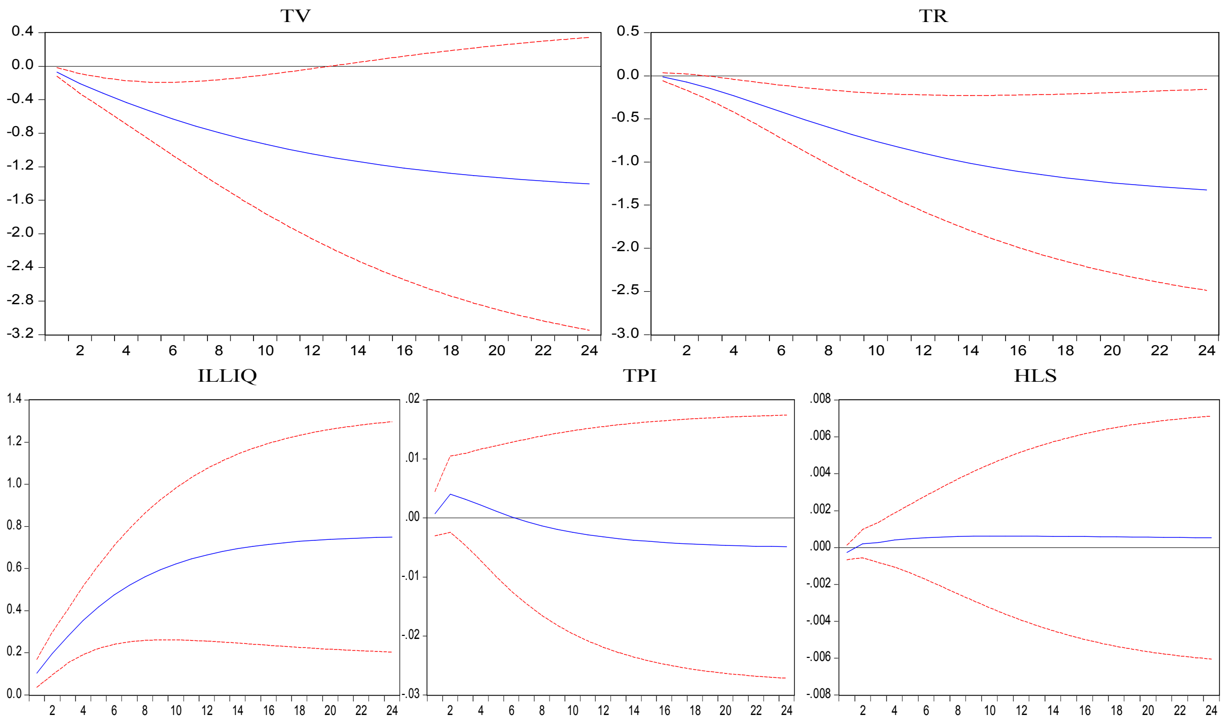

Table 1: Summary statistics and correlation matrix

Panel A: Summary Statistics													
	TV	TR	ILLIQ	TPI	HLS	EPU	SENT	RM	IP	IR	FII	STDV	RET
Mean	0.757	0.83	0.444	0.894	0.014	4.483	6.236	1.359	6.069	5.92	1.75	7.887	0.13
Median	0.694	0.92	0.274	0.754	0.013	4.503	6.05	1.516	6.056	6	1.36	7.735	0.15
Maximum	1.33	1.43	1.95	2.964	0.037	5.647	11.07	2.953	19.981	9.1	9.99	20.077	1.5
Minimum	0.04	0.158	0.001	0.004	0.006	3.216	0.73	-2.167	-7.242	-2.3	-5.49	1.109	-1.72
Std. Dev.	1.264	0.692	0.488	0.568	0.004	0.548	1.934	0.83	5.419	2.82	2.71	4.123	0.46
Skewness	-1.288	-0.76	1.56	1.378	1.79	-0.112	0.339	0.326	0.258	-0.45	0.37	0.926	-0.21
Kurtosis	4.033	3.575	4.805	5.223	5.269	2.351	3.813	2.66	3.046	3.14	3.4	4.304	4.79
Panel B: Correlation Matrix													
	TV	TR	ILLIQ	TPI	HLS	EPU	SENT	RM	IP	IR	FII	STDV	RET
TV	1												
TR	0.86	1											
ILLIQ	-0.25	-0.24	1										
TPI	-0.411	-0.146	0.13	1									
HLS	-0.383	-0.26	0.191	0.1	1								
EPU	-0.21	-0.18	0.2	0.33	0.42	1							
SENT	0.41	0.55	-0.01	-0.22	-0.17	-0.14	1						
RM	0.73	0.153	-0.03	-0.45	-0.05	-0.206	0.21	1					
IP	0.067	0.132	-0.02	-0.1	-0.01	-0.011	0.03	0.714	1				
IR	-0.08	-0.01	0.016	0.21	0.012	0.06	-0.31	-0.38	-0.16	1			
FII	0.253	0.58	-0.09	-0.11	-0.21	0.23	-0.09	0.052	0.161	-0.1	1		
STDV	-0.23	-0.46	0.19	0.22	0.21	0.025	-0.56	-0.03	0.003	0.01	-0.01	1	
RET	0.67	0.59	-0.28	-0.33	-0.11	-0.112	0.67	0.089	0.049	-0.14	0.35	-0.39	1

Note: This table presents the descriptive statistics and correlation matrix of liquidity variables i.e., traded value (TV), turnover rate (TR), Amihud's (2002) illiquidity ratio (ILLIQ), turnover price impact (TPI) and high-low spread (HLS); economic policy uncertainty index (EPU), and control variables such as investor sentiment measure (SENT), reserve money growth rate (RM), industrial production growth rate (IP), inflation rate (IR), net funds flow from foreign institutional investors (FII), monthly market standard deviation (STDV) and monthly market return (RET). Sample period consists of 168 monthly observations from January-2003 till December-2016.

Table 2: Unit root tests statistics

Variables	ADF		PP		KPSS	
	Intercept without trend	Intercept with trend	Intercept without trend	Intercept with trend	Intercept without trend	Intercept with trend
TV	-11.345***	-11.448***	-11.356***	-11.488***	0.68	0.61
TR	-13.25***	-13.18***	-13.12***	-13.10***	0.29	0.23
ILLIQ	-13.59***	-13.60***	-13.50***	-13.47***	0.12	0.13
TPI	-14.56***	-14.45***	-14.10***	-14.21***	0.17	0.14
HLS	-17.67***	-18.01***	-18.09***	-18.12***	0.23	0.19
EPU	-12.51***	-12.98***	-13.463***	-14.20***	0.26	0.16
SENT	-14.12***	-14.01***	-13.91***	-13.99***	0.25	0.21
RM	-16.26***	-16.35***	-16.97***	-16.05***	0.46	0.38
IP	-15.72***	-15.63***	-14.99***	-14.90***	0.31	0.23
IR	-12.56***	-12.42***	-12.11***	12.02***	0.25	0.19
FII	-14.29***	-14.38***	-13.95***	-14.05***	0.36	0.29
STDV	-12.87***	-12.68***	-12.546***	-12.254***	0.19	0.13
RET	-19.97***	-19.01***	-19.29***	-19.22***	0.13	0.11

Notes: The table reports the ADF (Augmented Dickey-Fuller), PP (Phillips-Perron) and KPSS (Kwiatkowski-Phillips-Schmidt-Shin) tests statistics for the unit root test. The optimal lag for ADF test and truncation lag for PP test are selected based on the AIC and SIC criteria. ADF and PP tests examine the null hypothesis of a unit root against the stationary alternative. For fixing the truncation lag for KPSS test, the Bartlett kernel method is selected as the spectral estimation methods, and the Newey–West method is employed for bandwidth. The KPSS test examines null of stationary. *** Significance at 1% level.

Table 3: VAR Granger-causality tests for EPU and stock market liquidity for the entire sample period (January-2003 to December-2016)

Panel (A): Granger causality tests: EPU and stock market liquidity (H_0 : EPU does not Granger cause stock market liquidity)					
Variables	TV	TR	ILLIQ	TPI	HLS
EPU	1.38	2.02	7.15**	5.98*	3.01

Panel (B): Granger causality tests: stock market liquidity variables and EPU (H_0 : Stock market liquidity does not Granger cause EPU)	
Variables	EPU
TV	2.30
TR	2.98
ILLIQ	1.09
TPI	1.22
HLS	2.01

Notes: This table presents χ2 statistics of pair wise Granger causality tests between EPU and stock market liquidity. Sample period consists of 168 monthly observations from January-2003 till December-2016. *, ** and *** denote 10%, 5% and 1% significance level respectively.

Table 4: Variance decomposition of stock market liquidity for the entire sample

Panel (A): Variance decomposition of traded value (TV)										
Period	Standard Error	TV	EPU	SENT	RM	IP	IR	FII	STDV	RET
1	0.002	93	0	0.55	1	0	1	0	2	2.45
6	0.009	66.5	1.5	2.5	12	2.4	4	3.5	4.1	3.5
12	0.0005	51	2.2	3.6	15.8	3	8.6	6.8	5.1	3.9
Panel (B): Variance decomposition of turnover rate (TR)										
Period	Standard Error	TR	EPU	SENT	RM	IP	IR	FII	STDV	RET
1	0.0001	89	0.9	0.7	2.2	0	1.5	0	3.2	2.5
6	0.009	63	1.9	1.6	14	2.61	3.99	5.29	3.8	3.81
12	0.0032	49	2.7	2.1	19	3.9	7.7	5.7	4.2	5.7
Panel (C): Variance decomposition of Amihud's (2002) illiquidity ratio (ILLIQ)										
Period	Standard Error	ILLIQ	EPU	SENT	RM	IP	IR	FII	STDV	RET
1	0.0011	94	0.8	0.5	0.4	0	0.8	0	2.3	1.2
6	0.0021	67	1.2	1.6	11	2.9	4.1	5.2	3.5	3.5
12	0.003	51	3.3	3.1	14.7	3.9	9.7	5.7	4.5	4.1
Panel (D): Variance decomposition of turnover price impact (TPI)										
Period	Standard Error	TPI	EPU	SENT	RM	IP	IR	FII	STDV	RET
1	0.088	86	1.9	1.2	1.5	0.5	1.5	1	3.2	2.5
6	0.004	65	2.5	1.3	13.6	2.6	3.2	5.2	3.1	3.5
12	0.006	48	3.4	2.6	17	4	9.7	5.7	5.4	4.2
Panel (E): Variance decomposition of high-low spread (HLS)										
Period	Standard Error	HLS	EPU	SENT	RM	IP	IR	FII	STDV	RET
1	0.008	91	0.7	0.2	2.2	0.2	0.8	0	2.8	2.1
6	0.002	69	1.5	0.9	11	2.6	3	5.2	3.3	3.5
12	0.0044	55	2.2	1.1	15	3.7	9	5.7	4.2	4.1

Notes: This table presents the variance decomposition of stock market liquidity variables i.e., traded value (TV), turnover rate (TR), Amihud's (2002) illiquidity ratio (ILLIQ), turnover price impact (TPI) and high-low spread (HLS) for the sample period spanning from January-2003 till December-2016.

Table 5: VAR Granger-causality tests for EPU and stock market liquidity for sub-sample1 (January-2003 to July-2007)

Panel (A): Granger causality tests: EPU and stock market liquidity (H_0 : EPU does not Granger cause stock market liquidity)					
Variables	TV	TR	ILLIQ	TPI	HLS
EPU	2.24	3.11	8.44**	6.09*	2.99
Panel (B): Granger causality tests: stock market liquidity variables and EPU (H_0 : Stock market liquidity does not Granger cause EPU)					
Variables	EPU				
TV	2.77				
TR	2.11				
ILLIQ	1.59				
TPI	3.78				
HLS	4.15				

Notes: This table presents $\chi 2$ statistics of pair wise Granger causality tests between EPU and stock market liquidity. Sample period consists of monthly observations from January-2003 till July-2007. *, ** and *** denote 10%, 5% and 1% significance level respectively.

Table 6: VAR Granger-causality tests for EPU and stock market liquidity for sub-sample2 (August-2007 to December-2016)

Panel (A): Granger causality tests: EPU and stock market liquidity (H_0 : EPU does not Granger cause stock market liquidity)					
Variables	TV	TR	ILLIQ	TPI	HLS
EPU	9.69***	11.22***	12.45***	4.14	12.99***

Panel (B): Granger causality tests: stock market liquidity variables and EPU (H_0 : Stock market liquidity does not Granger cause EPU)	
Variables	EPU
TV	3.07
TR	4.55
ILLIQ	9.59***
TPI	3.78
HLS	11.15***

Notes: This table presents $\chi 2$ statistics of pair wise Granger causality tests between EPU and stock market liquidity. Sample period consists of monthly observations from August-2007 till December-2016. *, ** and *** denote 10%, 5% and 1% significance level respectively.

Table 7: Variance decomposition of stock market liquidity for the sub-sample1

Panel (A): Variance decomposition of traded value (TV)										
Period	Standard Error	TV	EPU	SENT	RM	IP	IR	FII	STDV	RET
1	0.0007	92	0.2	0.4	1	0.3	1.3	0	2.26	2.54
6	0.009	64	2.1	2.6	7.8	3.9	5.6	4.4	4.7	4.9
12	0.017	49	5.5	6.1	11	3	9.4	5.2	5.2	5.6
Panel (B): Variance decomposition of turnover rate (TR)										
Period	Standard Error	TR	EPU	SENT	RM	IP	IR	FII	STDV	RET
1	0.0003	87	0.7	1.2	1.1	0.6	2.1	1.1	3.2	3
6	0.0092	63	3.2	2.9	6.1	2.8	6	5.3	5	5.7
12	0.0137	52	6.8	5.3	10	3.5	6.8	5.7	4.2	5.7
Panel (C): Variance decomposition of Amihud's (2002) illiquidity ratio (ILLIQ)										
Period	Standard Error	ILLIQ	EPU	SENT	RM	IP	IR	FII	STDV	RET
1	0.055	93	1.1	0.5	0.9	1	0.6	0.2	1.5	1.2
6	0.0031	65	3.9	2.5	5.9	3.6	6.7	4.1	4.4	3.9
12	0.022	51	4.5	5.8	12	3.2	9	4.2	5.6	4.7
Panel (D): Variance decomposition of turnover price impact (TPI)										
Period	Standard Error	TPI	EPU	SENT	RM	IP	IR	FII	STDV	RET
1	0.004	83	0.8	1.2	2	1.3	2.7	1.5	3.7	3.8
6	0.011	64.3	3.1	3.3	10	2.6	3.2	5.2	4.2	4.1
12	0.0033	53	4.5	4.2	11	4	8	5.7	5.2	4.4
Panel (E): Variance decomposition of high-low spread (HLS)										
Period	Standard Error	HLS	EPU	SENT	RM	IP	IR	FII	STDV	RET
1	0.0013	85	1.2	1.6	2.2	0.2	1.9	1.1	3.4	3.4
6	0.0029	67	3.9	5	6.4	2.6	4.3	3.9	3.4	3.5
12	0.0014	50	6.2	5.5	13	3.7	6.8	4.3	5.4	5.1

Notes: This table presents the variance decomposition of stock market liquidity variables i.e., traded value (TV), turnover rate (TR), Amihud's (2002) illiquidity ratio (ILLIQ), turnover price impact (TPI) and high-low spread (HLS) for the sample period spanning from January-2003 till July-2007.

Table 8: Variance decomposition of stock market liquidity for the sub-sample2

Panel (A): Variance decomposition of traded value (TV)										
Period	Standard Error	TV	EPU	SENT	RM	IP	IR	FII	STDV	RET
1	0.017	91	1.4	1.85	0.2	0.3	0.7	0	2.1	2.45
6	0.029	64	5.5	4.7	5.7	2.4	4	3.5	5.9	4.3
12	0.0071	44	10.5	9.7	8.5	3	7.2	6.8	5.2	5.1
Panel (B): Variance decomposition of turnover rate (TR)										
Period	Standard Error	TR	EPU	SENT	RM	IP	IR	FII	STDV	RET
1	0.0005	88	2.1	1.2	1.1	0.6	0.9	0.4	3.2	2.5
6	0.0092	61	5.9	4.9	5.4	2.6	4.2	5.3	5	5.7
12	0.0037	48	9.99	8.89	7.8	3.9	5.82	5.7	4.2	5.7
Panel (C): Variance decomposition of Amihud's (2002) illiquidity ratio (ILLIQ)										
Period	Standard Error	ILLIQ	EPU	SENT	RM	IP	IR	FII	STDV	RET
1	0.0135	92.5	1.1	0.5	0.4	1	0.8	0.2	2.3	1.2
6	0.0001	66	6.2	5.5	5.3	2.9	3.4	3.9	3.5	3.3
12	0.0203	52	9.3	8.5	7.7	3.2	6.5	4.2	4.5	4.1
Panel (D): Variance decomposition of turnover price impact (TPI)										
Period	Standard Error	TPI	EPU	SENT	RM	IP	IR	FII	STDV	RET
1	0.008	84.5	0.8	2	1.5	0.5	2.7	1	3.2	3.8
6	0.014	63.5	3.3	3.7	10.5	2.6	3.2	5.2	3.9	4.1
12	0.0003	50	4.9	4.2	12	4	9.6	5.7	5.4	4.2
Panel (E): Variance decomposition of high-low spread (HLS)										
Period	Standard Error	HLS	EPU	SENT	RM	IP	IR	FII	STDV	RET
1	0.0018	87	1.3	2.1	2.2	0.2	0.8	0.7	2.8	2.9
6	0.0022	68	4.7	5.1	5.9	2.6	3	3.9	3.3	3.5
12	0.0004	54	8.81	7.67	7	3.7	5	4.3	4.42	5.1

Notes: This table presents the variance decomposition of stock market liquidity variables i.e., traded value (TV), turnover rate (TR), Amihud's (2002) illiquidity ratio (ILLIQ), turnover price impact (TPI) and high-low spread (HLS) for the sample period spanning from August-2007 till December-2016.