CHAPTER – III

OBJECTIVE, DATA BASE AND METHODOLOGY

3.1. Objective of the Study

From the review of literature it appears that most of the works on this subject have been conducted mainly in the context of the markets of USA and European countries which are historically developed and liquid as well. Although there is no shortage of research studies on Indian Capital Markets but liquidity aspect is somewhat unexplored. Krishnamurti and Lim (2000) have made an attempt to make a comparative study on BSE and NSE in respect of liquidity and volatility but their study period is not long enough to draw any concrete conclusion. Being one of the emerging markets, Indian stock market deserves a comprehensive study regarding its liquidity aspect.

Secondly, previous research studies have mainly concentrated on the cross sectional relationship between expected return and liquidity but, whether market liquidity at an aggregate level or index level is affected by macroeconomic factors of a country or not have rarely been investigated.

Thirdly, the firm-specific accounting information might influence investors’ decision in the stock market. Whether certain accounting information affects market liquidity or not also needs to be tested with adequate importance. Unfortunately this type of study is missing.

Finally, prediction of market liquidity another important area which requires attention of the capital market researchers.

So there are gaps in the literature in respect of liquidity as a subject of research.
Hence the objectives of the present study are

i) To make comparative study between the two premier stock exchanges of India that is BSE and NSE on the basis of liquidity.

ii) To forecast liquidity at the market level.

iii) To examine if there is any association between stock market liquidity and some selected macroeconomic indicators.

iv) To explore whether or not there is association between market liquidity at the script level and some commonly used accounting variables.

3.2. Data Base

In order to accomplish the objectives of the present study relevant market data have been collected for a period. These include the stock market aggregate ranging between January 1995 and December 2005 or index level data for both the BSE and NSE and data relating to the selected macroeconomic variables. To calculate market return data have been collected from December, 1994 to December, 2005. On the other hand for the purpose of 'firm-specific analysis', accounting data cover the period from the financial year 2001-02 to 2005-06.

It may also be mentioned here that this study employs secondary data collected from various sources.

The monthly time series data from different stock market variables such as SENSEX, NIFTY, Turnover, Market Capitalization etc. are collected mainly from RBI web sites. In some cases Capitaline Data Base Package has also been used. The monthly time series data for IIP and Exchange rate of Indian Rupee against the US Dollar have also been collected from the above mentioned web sites.
Gold price data have been procured from the World Gold Market websites while for the data regarding Consumer Price Index and Money Supply (M3) the present study uses OECD websites.

The Capitaline Data Base Package is the sole source for the company-specific accounting / corporate fundamental data.

Editing and classification of data have been made accounting to the requirement of the study.

3.3. Methodology

Methodology of a study comprises proper choice of the methods for the analysis and interpretation of the data set, consistent with the objective of the study. For the empirical investigation, various Statistical and Econometric tool have been applied in this study. They are as follows:

3.3.1. Spearman’s Rank Correlation Coefficient

Spearman’s Rank Correlation ($\rho$) of the following form is used:

$$\rho = 1 - \frac{6\sum d^2}{n(n^2 - 1)}$$

Where, $d$ denotes the difference of ranks and $n$ stands for the number of observations.

3.3.2. Karl Pearson’s Coefficient of Correlation

To find out the degree of association between the liquidity position of both the exchanges under condition Karl Pearson’s Coefficient of Correlation ($r_{x,y}$) of the following form is used:
\[ r_{x,y} = \frac{S_{x,y}}{s_x s_y} \]

Where, \( S_{x,y} \) = Sample covariance

\( s_x \) = Sample standard deviation of \( x \)

\( s_y \) = Sample standard deviation of \( y \)

### 3.3.3. Coefficient of Variation (CV)

To judge the relative vulnerability of BSE and NSE in terms of liquidity, Coefficient of Variation (CV) for each year and for the entire study period has been calculated. Greater the value of CV greater is the degree of vulnerability. It has been calculated as under:

\[
CV = \frac{\text{Standard Deviation}}{\text{Mean}} \times 100
\]

### 3.3.4. Test of Significance for Difference of Means

To test whether or not there is any significant different between the mean of the liquidity position of BSE (\( \mu_{BSE} \)) and that of NSE (\( \mu_{NSE} \)) over the entire study period, 't' test has been applied.

The hypothesis are:

\[ H_0 : \mu_{BSE} = \mu_{NSE} \]

\[ H_a : \mu_{BSE} \neq \mu_{NSE} \]

The null hypothesis would be rejected against the alternative hypothesis at the significance level \( \alpha \) if computed 't' statistic of the following form is less than the critical t at the level \( \alpha \).

't' statistic have been calculated in the following manner:
\[
t = \frac{\bar{X}_{\text{BSE}} - \bar{X}_{\text{NSE}}}{\sqrt{\frac{S^2_{\text{BSE}}}{n_{\text{BSE}}} + \frac{S^2_{\text{NSE}}}{n_{\text{NSE}}}}}
\]

Where, \( \bar{X}_{\text{BSE}} \) is sample mean liquidity of BSE
\( \bar{X}_{\text{NSE}} \) is sample mean liquidity of NSE
\( S^2_{\text{BSE}} \) is sample variance of BSE
\( S^2_{\text{NSE}} \) is sample variance of BSE

3.3.5. Paired t test

For a paired t test, the observations of two samples need to be in matched pairs. To apply this test first of all difference score (D) for each matched pair is calculated and the average of such matched differences is worked out (from now \( \bar{D} \)). The sample variance of difference score (D) is also calculated \([\sigma_{\text{diff}}]^2\). If the values from the two matched sample are denoted as \( X_i \) and \( Y_i \) and the differences by \( D_i \) then

\[
\bar{D} = \frac{\sum D_i}{n} \quad \text{and} \quad (\sigma_{\text{diff}})^2 = \frac{\sum (D_i - \bar{D})^2 \cdot n}{n - 1}.
\]

Assuming the said differences are normally distributed and independent that t statistics under paired t test is calculated as under:

\[
t = \frac{\bar{D} - 0}{\sigma_{\text{diff}} / \sqrt{n}} \quad \text{with} \ (n - 1) \text{ degrees of freedom}
\]

Where, \( \bar{D} \) = Mean of differences
\( \sigma_{\text{diff}} \) = Standard deviation of differences
\( n \) = Number of matched pairs
The null hypothesis of zero mean difference would be rejected at the significance level $\alpha$ if computed $t$ statistics of the above form is less than the critical $t$ at the level $\alpha$.

3.3.6. Autoregressive Integrated Moving Average (ARIMA) Method

ARIMA model has been used to forecast the liquidity positions of both the exchanges.

Since ARIMA model is an iterative process and some short of trial and error is inevitable, rigorous mathematical computation is necessary. Hence the popular econometrics software “Eviews 3” has been used for all computation purposes. The details of the process is given in the Chapter VI.

3.3.7. Ordinary Least Square Regression

This study has employed OLS regression to investigate the relationship between liquidity variables and other variables. The detailed procedure is discussed in chapters VII and VIII.

3.3.8. Principal Component Analysis

Principal component analysis has been employed in order to identify the factors which have significant bearing upon the scrip level market liquidity. Before the same is applied, an attempt has been made here to make the data relating to the firm-specific selected factors (accounting variables) free from multi-co-linearity. Detail description of the methodology or technique has been given in the chapters which deals with the issue of the association between Stock Market Liquidity and
some selected macroeconomic indicators and association between market liquidity and the firm-specific factors.

### 3.3.9. Error Correlation Model

The present study applies Error Correlation and Co-integration mechanism to find out the possible impact of selected economic variables on stock market liquidity of both the exchanges. In the context Unit Root Test is also applied. All the related methodologies have been discussed in Chapter VII.