The Association Between Market Liquidity at the Scrip Level and Accounting Variables: The Indian Evidence

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1. INTRODUCTION

According to the Efficient Market Hypothesis, a stock market is efficient if the prices fully reflect all information. Thus security prices are affected by information disclosure suggesting the importance of information disclosure for investors and capital market analysts. Here lies the importance of accounting information. According to Breton and Taffler (1995), the accounting information disclosed by the firm is one of the most important information sources for investors while valuing a firm. It is generally agreed that the financial objective of the firm is maximization of the shareholders' wealth which is expected to determine the market value of the firm's share prices. Again the market value of firm's share would be affected by all types of information. In this regard, the accounting information affect the share price considerably as investors consider financial accounting information as the management's policy in the areas of production, purchase, marketing, technology, finance and so on. The accounting information also reveals a picture of a particular firm's operating risk, financial risk and business risk. Research study conducted by Ball and Brown (1969) reveals that 35 to 40 percent of cross sectional variability of systematic risk can be explained by the co-movement in the accounting income of the firms. The linkage between accounting variables and stock market return continues to be an ongoing research activity. Beaver, Kettler and Scholes (1970) in an empirical study find strong degree of association between accounting and market beta. Kulkarni, Powers and Shannon(1991) report that even though the market takes into consideration other variables besides the accounting beta in estimating risk, accounting beta also can be used safely where market data is not available for calculating market beta. Malik and Ghosh (1996) find leverage and growth of assets could be used as the risk proxies. Researchers working in this filed, empirically find that some accounting variables are significantly related to market return. Barber and Layon's (1997) study reveals that the size of the firm and Book to Market value ratio significantly explains the cross sectional variations in the stock return. From the available empirical studies it appears that the relationship between some accounting variables and market return and risk is well established in the financial literature but whether there exists any association between stock market liquidity and accounting variables or not is yet to be investigated. In the present study, an attempt has been made to find out if there is any relationship between five arbitrarily selected accounting variables with stock market liquidity at firm level using cross-sectional data of 80 Indian companies.

2. SELECTION CRITERIA OF COMPANIES IN THE STUDY

The sample of firms in this study includes only those companies which are listed both in the BSE and NSE within the study period starting from 2001-02 to 2005-06. Altogether 80 companies have been selected from different industries which satisfy the following criteria:

i) A company which is listed in both BSE and NSE during the study period.
ii) A company whose financial year ends on 31st March every year during the study period.
iii) Necessary data are available in the CAPITALINE Database Package during the period of investigation.

3. SCRIP LEVEL LIQUIDITY VARIABLE

Stock market liquidity has many facets. It is not directly observable like stock returns. A large variant of techniques are available in the literature to measure liquidity. According to Amihud (2002), it is doubtful whether there exists any single measure that captures all aspects of liquidity. Moreover, there are many constraints in the emerging markets regarding the availability of data to construct sophisticated measures of stock market liquidity. Many measures, particularly the spread and depth related measures could not be computed due to the unavailability of time series data regarding this. Recently, impact cost has been used as the measure of liquidity in NSE but data for the same is not available for BSE during the entire study period.

Amivest Liquidity Ratio of the following form has been used in the present study as the measurement of market liquidity:

$$\text{Amivest Liquidity Ratio} = \frac{\text{Turnover for the Financial Year}}{\left|\text{Market Return for the Financial Year}\right|} \times \frac{1}{10^2}$$

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Where, market return = $100^* \{\ln P_t - \ln P_{t-1}\}$

Here P is the closing Price for a particular scrip at 31st March

The liquidity has been used in the natural logarithmic form (ln).

4. DESCRIPTION OF FIRM-SPECIFIC FACTORS (ACCOUNTING VARIABLES) AND DEVELOPMENT OF HYPOTHESIS

From the introductory section of this chapter it appears that several attempts have been made to study the impact of firm specific factors related through the accounting variables on stock market variables particularly the systematic risk, beta (b) of a particular script. Though no such direct theoretical relationship is available between the corporate fundaments and market liquidity of a particular script, it could be possible to establish a link between the two as there exists a relationship between beta and market liquidity.

It has been mentioned earlier that Amihud and Mendelson (1986) have proposed that foregone market liquidity or lack of liquidity (that is illiquidity) is a component of risk and Chordia et al (2000) establish that individual stock liquidity co-varies with industry-liquidity as well as market liquidity. Hence, like beta, illiquidity is a systematic risk.

Since ß is correlated to various accounting variables, illiquidity (or liquidity) could also be expected to have association with the accounting variables.

In this chapter of the present study, therefore, an attempt has been made to find out the degree of such association, if any, between scrip level liquidity and the following corporate fundamentals :

a) Growth of Assets;

b) Growth of Sales;

c) Profit Before Interest and Taxes;

d) Leverage in terms of Debt-Equity Ratio;

e) Corporate Liquidity measured in terms of Current Ratio.

Growth in Assets and Growth in Sales and Market Liquidity

Present study employs the growth of assets and growth of sales as the two major accounting variables.

FASB defines assets as probable future benefits to be obtained or controlled by a particular entity as a result of past transactions or events. With the increase in the growth of total assets, it is expected that the firm's income generating capacity would go up. The growth of the firm has been presented by ln Assets. Where ln refers to the natural logarithm.

On the other hand, sales is one of the most important matters of concern for any firm. Variability in sales is one of the reasons for operating or business risk of a firm. Sales are affected mainly due to three reasons. Firstly, economic conditions for a particular industry may determine the sales. Secondly, business cycle may have a major impact on sales. Finally, due to managerial policies, product-market decision, labour dispute etc. sales may be influenced. The growth of sales has been represented by ln sales. Where ln denotes natural logarithm.

Both the growth of assets and growth in sales should be positively (negatively) related to liquidity (illiquidity). The rationale behind this a- priori relationship is that growth in both these variables denotes that the firm can earn stable rate of return and does not experience unexpected price variance [Malik and Ghosh (1996)]. Hence, the spread between bid and ash price is also expected to be on the lower side and that could increase liquidity (A & M, 1986).

Therefore, the relationship between the percentage change in market liquidity and growth of the above two variables could be hypothised by the following two single log-log regressions : (This model is also called as double log model)

$$\text{In liq} = \beta_0 + \beta_1 \text{ in Assets} \quad \ldots (1)$$

and

$$\text{In liq} = \beta_0 + \beta_1 \text{ in Sales} \quad \ldots (2)$$

In both the cases it is expected that the coefficients of independent variables (β_1) would be positive.

Profitability and market liquidity

In order to investigate the possible relationship between scrip level liquidity and accounting profit of a firm, the present study takes into account the Profit Before Interest and Taxes (PBIT). Profit is a relative term and it could be defined in various ways. Since the present study is associated with the scrip level liquidity. Profit After Tax (PAT) might be a better choice as the equity shareholders are mainly interested in PAT. But as the present study seeks to investigate into the impact

of firm-level profitability on the stock market liquidity, PBIT has been chosen as a surrogate of the former. The choice of PBIT gets weight as this profit is calculated before the payment of interest on debts and payment of tax and is suitable for comparing profitability of firms with divergent debt policies and tax obligation. Stability in earnings of the firms allows them to follow a policy of stable dividend pay out. This in turn, is expected to earn investors' confidence and as a result of that the demands for the shares of those companies are expected to be high. Hence it can be hypothesised that an increase in PBIT would lead to a positive change in market liquidity of scrips.

Leverage and Market Liquidity :

To investigate the relationship between liquidity at the scrip level and the leverage of a firm, the present study measures leverage in terms of Debt-Equity Ratio of the following form :

$$\frac{\text{Total Debt}}{\text{Shareholders' Equity}}$$

For the purpose of the present study, shareholders' equity or net worth excludes Preference Share Capital. This ratio reflects the relative claims of Creditors and shareholders against the assets of the firm. A high ratio indicates a huge pressure from the creditors towards the managerial decision making. Although due to a smaller debt the shareholders might be deprived of the gains of leverage.

Beaver, Ketter and Scholes (1970) find leverage is positively related to the systematic risk. Hence based on this it may be argued here that Debt-Equity Ratio would be negatively related to the changes in market liquidity.

Corporate Liquidity and Stock Market Liquidity

Finally, to find the association between scrip level market liquidity and corporate liquidity, the present study considers current ratio of the following form to measure the corporate liquidity:

$$\frac{\text{Current Assets}}{\text{Current Liability}}$$

This ratio is an indicator of firm's ability to meet its short term obligation and a high current ratio usually shows the firm's healthy solvency position. A healthy current ratio helps the firm to adapt itself to a changing business scenario which results in firm's stability in terms of earnings. Hence a positive relationship between current ratio and scrip level liquidity is expected.

In order to investigate into the above mentioned association, the present study applies semi log model. This is also known as log-lin model which is applied here to investigate the expected relationship between scrip level liquidity and three accounting variables namely, PBIT, D-E Ratio and CA / CL ratio. For this purpose, the following three two-variable regression equations have been constructed :

$$\text{In liq} = \beta_0 + \beta_1 \text{ PBIT} \quad \ldots\ldots (3)$$

$$\text{In liq} = \beta_0 + \beta_1 \text{ D-E Ratio} \quad \ldots\ldots (4)$$

and

$$\text{In liq} = \beta_0 + \beta_1 \text{ CA / CL Ratio} \quad \ldots\ldots (5)$$

In log-lin model, the slope coefficient (β_1) measures the relative change in regressand (here market liquidity) for a absolute change in the value of the regressor (in this case any of the three accounting variables, namely, PBIT, D-E Ratio and CA / CL Ratio). That is :

$$\beta_1 = \frac{\text{relative change in regressand}}{\text{absolute change in regressor}}$$

It is expected that β_1 for the equations 3 and 5 would be positive and a negative β_1 could be expected for the equation 4.

Finally to observe whether the predictive ability of the model increases or not the following multiple regression has also been run :

$$\text{In liq} = \beta_0 + \beta_1 \text{ In Assets} + \beta_2 \text{ In Sales} + \beta_3 \text{ PBIT} + \beta_4 \text{ D-E Ratio} + \beta_5 \text{ CA / CL Ratio} + \mu_i \quad \ldots\ldots (6)$$

In this case too, the already explained relationships are expected to hold more specifically, such relationships can be summarised as under :

$ß_1 > 0, ß_2 > 0, ß_3 > 0, ß_4 < 0, ß_5 > 0$

Slope co-efficient	Accounting variable	Expected relationship
$ß_1$	Assets Growth	Positive
$ß_2$	Sales Growth	Positive
$ß_3$	PBIT (Profitability)	Positive
$ß_4$	D-E ratio (leverage)	Negative
$ß_5$	CA/CL Ratio (Corporate Liquidity)	Positive

5. RESULTS AND FINDINGS

The regression results of the above six equations are presented in the following sub-sections:

5.1.1. Percentage Change in Scrip Level Market Liquidity and Growth of Assets

The results of OLS equation 1 investigating the relationship between percentage change in scrip level liquidity and growth of Assets have been reported in tables 1 and 2 for BSE and NSE respectively.

From the results of Table 1 it appears that the $ß_1$ coefficients are positive and they are found to be significant at a very high level (t-value). The adjusted R^2 values are also quite high ranging between 0.576 to 0.794. The F values are also significant although it could be mentioned here that for any two-variables, OLS model both the t and F statistic would give the same result. Most importantly, the results are at par with the a-priori relationship.

Almost a mirror image of the results reported in Table 1 has been reflected in Table 2. All the $ß_1$ coefficients are highly significant and positive and Adjusted R^2 values are ranging between 0.458 to 0.746 indicating that the model is a good fit all through the five selected accounting years.

Hence irrespective of the stock-exchanges, the relationship between the growth of Assets and the percentage change in liquidity is found to provide adequate support in favour of the a-priori relationship mentioned earlier.

5.1.2. Percentage Change in Scrip Level Market Liquidity and Growth of Sales

The results of OLS equation 2 investigating the relationship between percentage change in market liquidity and growth of sales of the firms have been tabulated in tables 3 and 4 for BSE and NSE respectively.

The empirical findings (Table 3) strongly advocate the positive impact of growth of sales on percentage change in market liquidity of the equity shares which are listed in BSE. The observed coefficients of in Sales ($ß_1$) are highly significant all through the study period. Observed Adjusted R^2 values are also on higher sides [ranging between 0.472 to 0.710] backed by highly significant F statistic.

The results reported in Table 4, represent the results of simple log-linear regression-equation 2 (for shares listed in NSE). These results bring out the same view what have been revealed in case of the same shares listed in the BSE (Table 3). It appears that a significantly positive impact of growth of sales prevails on the percentage change in market liquidity of shares listed in the NSE. The Adjusted R^2 values continue to be satisfactory and are backed by the highly significant F values.

Therefore, the a-priori relationship between growth of sales and percentage change in scrip level market liquidity has been established.

5.1.3. Impact of Absolute Change in PBIT and Relative Change in Scrip Level Market Liquidity

The results of log-lin equation 3 investigating the impact of absolute change in PBIT on the relative change in scrip level market liquidity have been reported in tables 5 and 6 for BSE and NSE listing respectively.

The results are encouraging in terms of significant $ß_1$ coefficients. In all cases, the empirical results are in conformity with the stated a-priori relationship. The Adjusted R^2 values are moderate and backed by the significant F values. The results of the above two tables suggest that absolute change in profit in terms of PBIT has a positive impact on the relative change in scrip level market liquidity. It indicates that investors are in search for those shares which earn consistent operating profit.

5.1.4. Impact of Absolute Change in Leverage (Debt-Equity Ratio) on Relative Change in Scrip Level Market Liquidity

The results of regression equation 4 investigating the relationship between the absolute change in leverage (measured by Debt-Equity Ratio) on the relative change in Scrip Level market Liquidity have been reported in Tables 7 and 8 for the shares which are listed in BSE and NSE respectively.

The results of both the tables show somewhat same scenario. The observe Adjusted R^2 values are quite low and in most of the cases, β_1 coefficients are not significant. For an exception, in the year 2001-2002 Adjusted R^2 value has been found as significant. Only in that very year a negatively significant $ß_1$ coefficient has also been reported which confirms the a-priori relationship between the regressor and the regressand. In all other cases, the study fails to establish any meaningful association between the variables under investigation.

5.1.5. Impact of Absolute Change in Corporate Liquidity (Current Ratio) on Relative Change in Market Liquidity

The log-lin regression results of equation 5 investigating the relationship between the absolute change in corporate liquidity (measured in terms of Current Ratio) on the relative change in the scrip level market liquidity have been reported in Tables 9 and 10 for shares listed in BSE and NSE respectively.

The Adjusted R^2 values are very small and F values are also not significant. Naturally none of the $ß_1$ values throughout the study period are found to be statistically significant.

Hence, the present study fails to establish the a-priori relationship regarding this matter.

5.1.6. Multiple Regression Results

a) The results of regression equation 6 have been reported in Table 11 for shares listed in BSE. A year-wise observation of the results reveals that the Adjusted R^2 values are quite high ranging between 0.678 to 0.786. They are backed by very highly significant F values. So the predictive power of the model is in general very good. However, except β_1 coefficients which indicate the impact of growth of assets on percentage change in market liquidity, the slope coefficients have been found insignificant.

For an exception besides a positive and significant $ß_1$ coefficient, the $ß_4$ coefficient which shows the impact of absolute change in D-E ratio on relative change in market liquidity has been found significantly negative in the year 2001-2002 which is consistent with the a-priori relationship stated earlier.

b) The multiple regression results of the said equation for NSE listing have been presented in the Table 8.12. The results are consistent with the findings of Table 11. The adjusted R^2 values are also quite high ranging between 0.621 to 0.737. These are backed by significant F values.

It also appears that except in the year of 2001-2002 where a negative significant $ß_4$ coefficient has been reported (again consistent with the expected relationship), among all other cases one and only $ß_1$ coefficients have been found positive and significant.

On the whole, the asset growth is found to have considerable bearing upon the market liquidity. Among the other firm-specific factors, leverage is found to have influenced the market liquidity significantly, as per a-priori relationship, only in the year 2001-2002.

Table 1. Relationship between % change in Liquidity (Amivest Liquidity Ratio) at the Scrip Level and Growth of Assets [scrips listed in BSE]

Financial Year	2005-06	2004-05	2003-04	2002-03	2001-02
Adj.R^2	0.689	0.794	0.724	0.645	0.576
F-statistic	140.282*	244.174*	166.594*	113.518*	85.229*
β_0	-2.208	-5.985	-6.032	-6.723	-8.320
t- statistic	-3.461*	-8.378*	-7.641*	-6.515*	-6.465*
β_1	0.970	1.463	1.359	1.478	1.610
t- statistic	11.844*	15.626*	12.907*	10.654*	9.232*

* Significant at 1% level.

Table 2. Relationship between % change in Liquidity (Amivest Liquidity Ratio) at the Scrip Level and Growth of Assets [scrips listed in NSE]

Financial Year	2005-06	2004-05	2003-04	2002-03	2001-02
Adj.R^2	0.687	0.746	0.721	0.558	0.458
F-statistic	139.152*	185.900*	163.556*	78.652*	52.314*
β_0	-3.087	-5.867	-5.947	-5.838	-7.009
t- statistic	-3.960*	-6.753*	-6.993*	-4.864*	-4.639*
β_1	1.180	1.533	1.451	1.428	1.481
t- statistic	11.796*	13.635*	12.789*	8.852*	7.233*

* Significant at 1% level.

Table 3. Relationship between % change in Liquidity (Amivest Liquidity Ratio) at the Scrip Level and Growth of Sales [scrips listed in BSE]

Financial Year	2005-06	2004-05	2003-04	2002-03	2001-02
Adj.R^2	0.652	0.710	0.472	0.483	0.576
F-statistic	119.225*	155.435*	57.287*	58.787*	85.229*
β_0	-1.864	-4.841	-2.672	-3.879	-8.320
t- statistic	-2.821*	-6.024*	-2.963*	-3.646*	-6.465*
β_1	0.934	1.324	0.932	1.129	1.610
t- statistic	10.919*	12.467*	7.569*	7.667*	9.232*

* Significant at 1% level.

Table 4. Relationship between %change in Liquidity (Amivest Liquidity Ratio) at the Scrip Level and Growth of Sales [scrips listed in NSE]

Financial Year	2005-06	2004-05	2003-04	2002-03	2001-02
Adj.R^2	0.656	0.691	0.493	0.462	0.435
F-statistic	121.014*	142.011*	61.530*	53.375*	48.052*
β_0	-2.700	-4.836	-2.508	-3.462	-6.874
t- statistic	-3.373*	-5.326*	-2.645*	-3.060*	-4.415*
β_1	1.141	1.430	1.046	1.145	1.497
t- statistic	11.001*	11.917*	7.844*	7.306*	6.932*

* Significant at 1% level.

Table 5. Relationship between Relative Change in Liquidity (Amivest Liquidity Ratio) at the Scrip Level and Absolute Change in PBIT [scrips listed in BSE]

Financial Year	2005-06	2004-05	2003-04	2002-03	2001-02
Adj.R^2	0.283	0.281	0.342	0.289	0.250
F-statistic	25.832*	25.525*	33.768*	26.186*	21.712*
β_0	4.641	4.250	3.125	3.209	2.696
t- statistic	19.558*	13.448*	10.591*	9.135*	6.897*
β_1	0.00064	0.000759	0.000146	0.000197	0.0002093
t- statistic	5.083*	5.052*	5.811*	5.117*	4.660*

* Significant at 1% level

Table 6. Relationship between Relative Change in Liquidity (Amivest Liquidity Ratio) at the Scrip Level and Absolute Change in PBIT [scrips listed in NSE]

Financial Year	2005-06	2004-05	2003-04	2002-03	2001-02
Adj.R^2	0.237	0.240	0.330	0.273	0.263
F-statistic	20.560*	20.912*	29.721*	24.330*	23.154*
β_0	5.294	5.023	3.860	3.722	3.044
t- statistic	17.761*	14.136*	11.966*	10.085*	7.599*
β_1	0.000721	0.000723	0.0001497	0.0001991	0.0002215
t- statistic	4.534*	4.573*	5.452*	4.933*	4.812*

* Significant at 1% level

Table 7. Relationship between Relative Change in Liquidity (Amivest Liquidity Ratio) at the Scrip Level and Absolute Change in D-E Ratio [scrips listed in BSE]

Financial Year	2005-06	2004-05	2003-04	2002-03	2001-02
Adj.R^2	-0.100	0.007	-0.015	-0.004	0.087
F-statistic	0.372	0.568	0.074	0.755	6.919*
β_0	5.283	5.102	3.973	4.107	3.959
t- statistic	16.454*	12.199*	10.554*	10.586*	8.182*
β_1	-0.176	-0.263	-0.00581	-0.00496	-0.656
t- statistic	-0.610	-0.753	-0.272	0.869	2.630*

* Significant at 1% level.

Table 8. Relationship between Relative Change in Liquidity (Amivest Liquidity Ratio) at the Scrip Level and Absolute Change in D-E Ratio [scrips listed in NSE]

Financial Year	2005-06	2004-05	2003-04	2002-03	2001-02
Adj.R^2	-0.008	-0.009	-0.015	0.004	0.124
F-statistic	0.469	0.456	0.048	0.770	9.800*
β_0	6.042	5.882	4.623	4.635	4.480
t- statistic	15.466*	12.843*	10.860*	10.926*	9.146*
β_1	-0.240	-0.259	0.00368	0.00154	-0.791
t- statistic	-0.685	-0.675	0.218	-0.194	-3.131*

* Significant at 1% level.

Table 9. Relationship between Relative Change in Liquidity (Amivest Liquidity Ratio) at the Scrip Level and Absolute Change in CA/CL Ratio [scrips listed in BSE]

Financial Year	2005-06	2004-05	2003-04	2002-03	2001-02
Adj.R^2	-0.005	0.004	-0.014	-0.016	-0.11
F-statistic	0.672	0.219	0.146	0.012	0.305
β_0	5.730	5.346	3.833	4.030	3.081
t- statistic	7.785*	5.481*	9.643*	10.019*	5.513*
β_1	-0.477	-0.361	0.006022	-0.000827	0.123
t- statistic	0.104	-0.468	0.382	-0.108	0.553

* Significant at 1% level.

Table 10. Relationship between Relative Change in Liquidity(Amivest Liquidity Ratio) at the Scrip Level and Absolute Change in CA/CL Ratio [scrips listed in NSE]

Financial Year	2005-06	2004-05	2003-04	2002-03	2001-02
Adj.R^2	-0.002	0.009	-0.015	-0.016	-0.016
F-statistics	0.894	0.460	0.048	0.770	0.015
β_0	6.673	6.379	4.623	4.635	3.614
t- statistics	7.459*	5.989*	10.860*	11.496*	6.242*
β_1	-0.669	-0.571	0.00368	-0.00520	0.00283
t- statistics	-0.946	-0.678	0.218	-0.878	0.122

* Significant at 1% level

Table 11. Relationship between Liquidity (Amivest Liquidity Ratio) at the Scrip Level and all Accounting Variables under Consideration [scrips listed in BSE]

Financial Year	2005-06	2004-05	2003-04	2002-03	2001-02
Adj.R^2	0.678	0.786	0.717	0.695	0.754
F-statistic	27.654*	47.350*	32.991*	25.958*	38.465*
β_0	-2.338	-6.763	-6.449	-6.966	-9.637
t- statistic	-2.572*	-6.641*	-6.037*	-5.452*	-5.896*
β_1	0.666	1.331	1.065	1.272	2.009
t- statistic	2.296*	4.596*	3.407*	3.045*	4.731*
β_2	0.268	0.169	0.349	0.268	-0.222
t- statistic	0.943	0.622	1.182	0.616	-0.482
β_3	0.0001034	-0.00000197	-0.0000079	-0.000000245	-0.0000194
t- statistic	0.365	-0.187	-0.330	-0.001	-0.534
β_4	0.05962	0.003325	0.00946	-0.00741	-0.884
t- statistic	0.355	0.204	0.811	-2.007	-5.239*
β_5	0.257	0.437	0.158	-0.0000346	0.745
t- statistic	0.749	1.184	0.917	0.003	1.297

* Significant at 1% level

Table 12. Relationship between Liquidity (Amivest Liquidity Ratio) at the Scrip Level and all Accounting Variables under Consideration [scrips listed in NSE]

Financial Year	2005-06	2004-05	2003-04	2002-03	2001-02
Adj.R^2	0.671	0.737	0.719	0.621	0.661
F-statistic	26.735*	36.397*	33.233*	18.652*	24.814
β_0	-3.399	-6.782	-6.819	-6.335	-7.649
t- statistic	-3.037*	-5.492*	-5.982*	-4.279*	-3.852*
β_1	0.841	1.268	1.138	0.757	1.745
t- statistic	2.357*	3.612*	3.412*	1.563*	3.382*
β_2	0.348	0.367	0.443	0.755	-0.001
t- statistic	0.995	1.117	1.407	1.495	-0.179
β_3	0.00002215	0.000083	-0.0000231	0.00000373	0.00000339
t- statistic	0.168	-0.651	-0.904	0.900	-0.077
β_4	0.02275	0.006583	-0.100	-0.00564	-0.989
t- statistic	0.110	0.334	-0.805	-1.318	-4.828*
β_5	0.201	0.301	0.166	0.009885	0.392
t- statistic	0.474	0.674	0.903	0.838	0.562

* Significant at 1% level

From the results of multiple regression analysis, it appears that the predictive power of the model has increased. However, the t statistics shows that most of the β_1 coefficients except β_1 are insignificant. This might be due to the problem of multi co-linearity between the independent variables. Hence, correlations have been computed year wise among the independent variables and results have been reported in the following tables (Table 13 to Table 17).

Table 13: Correlation Matrix: Year 2005-06

	Ln Assets	Ln Sales	PBIT	D-E Ratio	CA/CLRatio
Ln Assets	1.000	0.954*	0.591*	-0.100	-0.165
Ln Sales	0.954*	1.000	0.569*	-0.139	-0.222
PBIT	0.591*	0.569*	1.000	-0.195	-0.172
D-E Ratio	-0.100	-0.139	-0.195	1.000	-0.055
CA/CLRatio	-0.165	-0.222	-0.172	-0.055	1.000

* Significant at 1% level

Table 14: Correlation Matrix: Year 2004-05

	Ln Assets	Ln Sales	PBIT	D-E Ratio	CA/CLRatio
Ln Assets	1.000	0.939*	0.620*	-0.121	-0.138
Ln Sales	0.939*	1.000	0.590*	-0.120	-0.204
PBIT	0.620*	0.590*	1.000	-0.037	-0.171
D-E Ratio	-0.121	-0.120	-0.037	1.000	0.049
CA/CLRatio	-0.138	-0.204	-0.171	0.049	1.000

* Significant at 1% level

Table 15: Correlation Matrix: Year 2003-04

	Ln Assets	Ln Sales	PBIT	D-E Ratio	CA/CLRatio
Ln Assets	1.000	0.775*	0.696*	0.038	0.064
Ln Sales	0.775*	1.000	0.650*	0.017	-0.398
PBIT	0.696*	0.650*	1.000	-0.083	-0.103
D-E Ratio	0.038	0.017	-0.083	1.000	-0.084
CA/CLRatio	0.064	-0.398	-0.103	-0.084	1.000

* Significant at 1% level

Table 16: Correlation Matrix: Year 2002-03

	Ln Assets	Ln Sales	PBIT	D-E Ratio	CA/CLRatio
Ln Assets	1.000	0.761*	0.616*	0.087	0.088
Ln Sales	0.761*	1.000	0.609*	-0.035	-0.301
PBIT	0.616*	0.609*	1.000	-0.115	-0.058
D-E Ratio	0.087	-0.035	-0.115	1.000	-0.053
CA/CLRatio	0.088	-0.301	-0.058	-0.053	1.000

* Significant at 1% level

Table 17: Correlation Matrix: Year 2001-02

	Ln Assets	Ln Sales	PBIT	D-E Ratio	CA/CLRatio
Ln Assets	1.000	0.930*	0.491*	0.121	0.068
Ln Sales	0.930*	1.000	0.464*	0.025	-0.265
PBIT	0.491*	0.464*	1.000	-0.262	0.012
D-E Ratio	0.121	0.025	-0.262	1.000	-0.150
CA/CLRatio	0.068	-0.265	0.012	-0.150	1.000

* Significant at 1% level

A closer look at the aforementioned tables shows that in every year there exists highly significant correlation among three accounting variables namely ln Assets, ln Sales, and PBIT. But, other variables do not have any significant association at all. Due to this co linearity among these three variables, the regression results might be affected. The technique of Principal Component Analysis has been used to find out the principal components from the correlated accounting variables. The details of this mechanism are discussed in the following section.

7. PRINCIPAL COMPONENT ANALYSIS

As it has been mentioned earlier that the method of Principal Component Analysis could be applied by using the original values of the variables under consideration or their deviations from their means or the standardized variables (measured as the deviations of the variables from the means and divided by the standard deviations).

In this study, the construction of the principal components have been constructed by adopting the last method that is explanatory variables (ln Assets, ln Sales, and PBIT) are standardized by deducting from their means and subsequently divided by the standard deviations. That is to say [$\frac{y-[E(y)}{\sigma_y}$]. Where y is explanatory variables, E(y) and σ_y are mean and standard deviation respectively.

7.1 RESULTS OF PRINCIPAL COMPONENT ANALYSIS :

Year – 2005-06

Component	Eigen Value	% of Variance	Cumulative%
1	2.426	80.865	80.865
2	0.528	17.613	98.477
3	4.568E-02	1.523	100.000

Bartlett Test of Sphericity = 173.574* [* Significant at 1% level]

Following Kaiser's criterion (i.e. Eigen Value ≥1) the first principal component (PC_1) which accounts for 80.865% of the total variance of the explanatory variables has been chosen. This PC_1 might be considered as the joint effect of the three correlated variables previously mentioned.

Regressing ln Liquidity variable (ln liq) for both the exchanges on PC_1, D-E Ratio and CA/CL Ratio it has been found that for liquidity in terms of Amivest Liquidity Ratio

$$\ln liq_{BSE} = \underset{(10.561^*)}{4.711} + \underset{(11.170^*)}{1.703\ PC_1} + \underset{(0.686)}{0.116\ \text{D-E Ratio}} + \underset{(0.915)}{0.315\ \text{CA/CL Ratio}} \quad \text{……..(1)}$$

and

$$\ln liq_{NSE} = \underset{(9.707^*)}{5.476} + \underset{(10.510^*)}{2.027\ PC_1} + \underset{(0.513)}{0.109\ \text{D-E Ratio}} + \underset{(0.0.635)}{0.0.276\ \text{CA/CL}} \quad \text{Ratio ……..(2)}$$

Figures in brackets are t- statistic

* Significant at 1% level

Both the equations show that the impact of PC_1 is significantly positive on Scrip level liquidity. But no significant relationship could be established between liquidity and either of the D-E Ratio and CA/CL Ratio.

Year – 2004-05

Component	Eigen Value	% of Variance	Cumulative%
1	2.445	81.506	81.506
2	0.494	16.473	97.980
3	6.061E-02	2.020	100.000

Bartlett Test of Sphericity = 159.890* [* Significant at 1% level]

Following Kaiser's criterion (i.e. Eigen Value ≥ 1), the first principal component (PC_1) which accounts for 81.506% of the total variance of the explanatory variables has been chosen. This PC_1 might be considered as the joint effect of the three correlated variables previously mentioned.

Regressing ln Liquidity variable (ln liq) for both the exchanges on PC_1, D-E Ratio and CA/CL, Ratio, it has been found that for liquidity in terms of Amivest Liquidity Ratio:

$$\ln liq_{BSE} = \underset{(7.883^*)}{4.174} + \underset{(12.877^*)}{2.359\ PC_1} - \underset{(-0.122)}{2.24E\text{-}02\ \text{D-E Ratio}} + \underset{(1.564)}{0.641\ \text{CA/CL Ratio}} \quad \text{….....(1)}$$

and

$$\ln liq_{NSE} = \underset{(8.100^*)}{5.131} + \underset{(11.336^*)}{2.485\ PC_1} - \underset{(-0.001)}{3.07E\text{-}04\ \text{D-E Ratio}} + \underset{(0.982)}{0.482\ \text{CA/CL Ratio}} \quad \text{….....…..(2)}$$

Figures in brackets are t- statistic, * Significant at 1% level

From the results of the above two equations it is clear that PC_1 has a significant positive relationship on liquidity, but neither the Debt- Equity Ratio nor the Current Ratio has any impact on liquidity at the scrip level.

Year – 2003-04

Component	Eigen Value	% of Variance	Cumulative%
1	2.416	80.527	80.527
2	0.365	12.170	92.697
3	0.219	7.303	100.000

Bartlett Test of Sphericity = 100.548* [* Significant at 1% level]

Following Kaiser's criterion (i.e. Eigen Value ≥ 1), the first principal component (PC_1) which accounts for 80.527% of the total variance of the explanatory variables has been chosen. This PC_1 might be considered as the joint effect of the three correlated variables previously mentioned.

Regressing ln Liquidity variable (ln liq) for both the exchanges on PC_1, D-E Ratio and CA/CL Ratio, it has been found that for liquidity in terms of Amivest Liquidity Ratio:

$$\ln liq_{BSE} = 3.545 + 2.165\ PC_1 - 1.52E\text{-}02\ \text{D-E Ratio} + 0.267\ \text{CA/CL Ratio} \quad \text{……..(1)}$$
(13.612*) (11.291*) (-0.124) (2.877*)

and

$$\ln liq_{NSE} = 4.311 + 2.291\ PC_1 - 8.74E\text{-}03\ \text{D-E Ratio} + 0.256\ \text{CA/CL Ratio} \quad \text{……..(2)}$$
(15.080*) (10.886*) (-0.949) (2.514**)

Figures in brackets are t- statistic

* Significant at 1% level ** Significant at 5% level

The above two equations confirms the positive impact of PC_1 on liquidity. Moreover, only for the first time in this study period one can observe a positive relationship between Current Ratio and Liquidity at the scrip level. The results of multiple regression analysis where $ß_4$ values for this year is significantly positive.

Year – 2002-03

Component	Eigen Value	% of Variance	Cumulative%
1	2.326	77.547	77.547
2	0.434	14.475	92.022
3	0.239	7.987	100.000

Bartlett Test of Sphericity = 85.418* [* Significant at 1% level]

Following Kaiser's criterion (i.e. Eigen Value ≥ 1), the first principal component (PC_1) which accounts for 77.547% of the total variance of the explanatory variables has been chosen. This PC_1 might be considered as the joint effect of the three correlated variables previously mentioned.

Regressing ln Liquidity variable (ln liq) for both the exchanges on PC_1, D-E Ratio and CA/CL Ratio it has been found that

$$\ln liq_{BSE} = 3.945 + 2.372\ PC_1 - 3.90E\text{-}02\text{D-E Ratio} + 7.522\ \text{E-02CA/CL Ratio}.....(1)$$
(15.308*) (10.030*) (-1.105) (1.577)

and

$$\ln liq_{NSE} = 4.488 + 2.351\ PC_1 - 4.19E\text{-}02\ \text{D-E Ratio} + 6.713\ \text{E-02 CA/CL Ratio}\ ..(2)$$
(15.616*) (8.914*) (-1.063) (1.261)

Figures in brackets are t- statistic

* Significant at 1% level

Year – 2001-02

Component	Eigen Value	% of Variance	Cumulative%
1	2.238	74.585	74.585
2	0.695	21.159	97.744
3	6.767E-02	2.256	100.000

Bartlett Test of Sphericity = 133.241*

[* Significant at 1% level]

Following Kaiser's criterion (i.e. Eigen Value ≥ 1), the first principal component (PC_1) which accounts for 74.585% of the total variance of the explanatory variables has been chosen. This PC_1 might be considered as the joint effect of the three correlated variables previously mentioned.

Regressing ln Liquidity variable (ln liq) for both the exchanges on PC_1, D-E Ratio and CA/CL Ratio it has been found that

$$\ln liq_{BSE} = 2.415 + 2.665\ PC_1 - 0.450\ \text{D-E Ratio} + 0.968\ \text{CA/CL Ratio} \quad \text{……..(1)}$$
$$(2.815^*)\ (10.593^*)\ (-2.846^*)\ (1.749)$$

and

$$\ln liq_{NSE} = 3.536 + 2.527\ PC_1 - 0.633\ \text{D-E Ratio} + 0.583\ \text{CA/CL Ratio} \quad \text{……..(2)}$$
$$(3.665^*)\ (8.932^*)\ (-3.561^*)\ (0.936)$$

Figures in brackets are t- statistic,

* Significant at 1% level

8. CONCLUSION

In an attempt to measure the empirical relationship between scrip level market liquidity of firms listed both in the BSE and NSE with some selected accounting variables, the present study has employed two variable models and multivariable models. The results of two variable models are straight forward. In general, a positive impact of Growth of Assets, Growth of Sales and change in PBIT could be observed on the percentage change in scrip level market liquidity for both the exchanges when Amivest Liquidity ratio has been used. But in case of leverage, no consistent results are found during the study period. Moreover, the study has not found any concrete evidence to establish any relation ship between Current Ratio and Stock market liquidity.

When multiple regressions are taken into consideration, although the predictive power of the model has increased through out the study period but the results of the regressions faces the problem of multi co-linearity. Since the sources of the accounting information are either the Income Statements or the Balance Sheet, the existence of such relationships may be obvious. Therefore, the method of Principal Component Analysis has been adopted to find Principal Component from correlated variables. Results achieved from this mechanism give a conclusion that the joint effect of log of Assets, log of Sales and PBIT on scrip level market liquidity is significant and positive but no specific relationship has been found between the latter and other two accounting variables under consideration.

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