

# AN EMPIRICAL ANALYSIS OF SELECTED COMPANIES FROM NON-METAL, REAL ESTATE AND MINING INDUSTRIES IN INDIAN CAPITAL MARKET

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## ABSTRACT

*There exists a relationship between stock returns and trading volume in the world capital market and the changes in stock return does impact trading volume or trading volume does impact stock return. Some studies show that there is high degree relationship and some research studies show moderate or low or no relationship between stock return and trading volume. The present research paper attempts to examine empirical status of selected companies from non-metal, real estate and mining industries in India for finding out relationship between stock returns and trading volume. Hence, changes in returns and volume do reflect a relationship in non-metal industry but not in mining and real estate. Therefore, there is no randomness in the behaviour of stock return and trading volume changes in this study of non-metal industry in India. But in case of empirical analysis of three industries at firm level the result shows moderate degree of relationship between returns and volume of all 81 companies from non-metal, real estate and mining industries.*

**KEYWORDS:** Empirical analysis, Non-metal, Real estate, Mining.

## 1. INTRODUCTION

This paper investigates the relationship between stock returns and volume for 81 Indian companies from non-metal, real estate and mining industries. From the analysis, results and discussions we can say that the empirical result of granger causality test on firm level in non-metal, real estate and mining industries, 51 companies (see table 1.4) shows Return cause volume, 04 companies (CTIL, OAL, REL, RIL) shows Volume cause return, 03 companies (KCL, MCL, SCL) shows Bi-directional Causation and 23 companies (see table 1.4) shows No causation. Hence, we can say that most of the companies show Return cause volume at all. It means that the variables trading volume and stock return are moderate mutually granger cause to each other. But in case of empirical analysis of three industries at industry level the result shows that only non-metal industry do not have randomness in the behaviour. However, in case of mining and real estate industries there exists randomness in the behaviour between returns and volume relationship.

## 2. REVIEW OF LITERATURE

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In the last decades a number of studies have been conducted to explain the relationship between volume and returns in India.

We argue that the enhancement in volume and returns volatility may be attributed to index arbitrage process as derivative markets provide more ways for index arbitrageurs to trading. In the literature we reviewed the following article and research papers: Ahmad k. Masood, Ashraf S. & Ahmed S. (2008), Asai M. and Unite A. (2008), Ali (2006), Baklaci&Kasman (2006), Brajesh and Priyanka (2010), Chen C. and Zhou Z. (2001), Chen S. and Wei (2008), Chi-liang C. (2004), Christos F. and Dimitrios V. Vougas (2007), Chuntao Li and Jigang Ding (2003), Deo M., Srinivasan K. and Devanadhen K. (2008), Floros and Vougas (2007), Gebka B. (2005), Hasan B. and Adnam K. (2006). The objective of this research paper is to find a rational economic model to explain the relationship between volume and returns in India.

### 3. OBJECTIVES OF THE STUDY

1. To study the correlation between returns changes and volume in the Indian capital market of non-metal, real estate and mining industries.
2. To check the causality relationship between the volume and returns through Granger Causality Test for non-metal, real estate and mining industries.
3. To study that changes in trading volume leads the changes in stock returns or vice-versa. In other words we are examining, what are the causes of changes in stock returns and trading volume with two element return and volume of the industries.

### 4. DATA & SELECTED SAMPLE AND RESEARCH METHODOLOGY

The sample of this study comprises 81 Indian companies which is the main stocks of Indian industry. These companies are (for detail abbreviation see appendix). The data period is from Jan. 2002 to Dec. 2010. In this study, our data comprises stock returns calculated from adjusted monthly closing prices and traded quantity series of sample of all 81 major firms participating in Indian capital market because these firms are well representative of Indian companies. The volume and stock return data are provided by CMIE LTD and were taken from finance prowess finance database and newspaper and internet. The percentage returns of stock is defined as where,  $R_t$  is logarithmic monthly percentage return at time  $t$  and  $P_{t-1}$  and  $P_t$  are monthly closing price of an asset on two successive days  $t-1$  and  $t$  respectively.

### 5. STATISTICAL TECHNIQUES

In this study, in order to observe the relationship between stock return and

volume, the methodology was used in the current study consists of three steps which are as follow: Descriptive Statistics for preliminary investigation, ADF Test for checking Stationarity of Time Series Data and Granger Causality Tests for testing causal relationship between Trading Volume and Stock Returns.

### FIRST STEP

**The Durbin-Watson Statistics:** The Durbin-Watson Statistic is a test for first-order serial correlation. It is, the statistical measure for the linear association between adjacent from a regression model.

**Dickey-Fuller Unit Root Test (Stationary Test):-** We see that the hypothesis of a unit root is rejected by both the tests at 1%, 5% and 10% level, indicating both the series are stationary (i.e., a deterministic trend). It appears that there exists strong component of non-randomness in our stock return and trading volume. (E-View, 6)

### SECOND STEP

#### Granger Causality Test

If we want to know whether

"TQ" causes "RTN" or "RTN" causes "TQ", or bilateral causes,

"Lags to include" is "2",

**Table-1.1**

| ADF Test Statistic of Stock Returns and Trading Volume for all Companies (Jan. 2000 to Dec. 2010) |     |                |           |             |        |                     |          |
|---------------------------------------------------------------------------------------------------|-----|----------------|-----------|-------------|--------|---------------------|----------|
| Company Symbol                                                                                    | Lag | ADF Test-Stat. |           | Probability |        | Durbin-Watson Stat. |          |
|                                                                                                   |     | Rtn.           | Vol.      | Rtn.        | Vol.   | Rtn.                | Vol.     |
| CM&RL                                                                                             | 0   | -9.337514      | -6.980175 | 0.0000      | 0.0000 | 1.969022            | 1.992410 |
| GMDC                                                                                              | 0   | -9.423623      | -7.239731 | 0.0000      | 0.0000 | 2.015156            | 2.252826 |
| GNRE                                                                                              | 0   | -8.064892      | -4.549422 | 0.0000      | 0.0000 | 2.027482            | 2.523550 |
| HC&IL                                                                                             | 0   | -9.663465      | -7.394062 | 0.0000      | 0.0000 | 2.008243            | 2.153831 |
| HOEC                                                                                              | 0   | -9.214483      | -6.843297 | 0.0000      | 0.0000 | 1.978510            | 2.159239 |
| INSILCO                                                                                           | 0   | -11.45563      | -6.338228 | 0.0000      | 0.0000 | 2.018908            | 2.243428 |
| ONGC                                                                                              | 0   | -10.83853      | -5.639721 | 0.0000      | 0.0000 | 2.118705            | 2.258276 |
| OC&CL                                                                                             | 0   | -9.464499      | -6.992460 | 0.0000      | 0.0000 | 1.982017            | 2.127061 |
| SETL                                                                                              | 0   | -10.94821      | -7.392502 | 0.0000      | 0.0000 | 2.006865            | 2.132860 |
| SESAG                                                                                             | 0   | -8.068709      | -5.536470 | 0.0000      | 0.0000 | 2.101723            | 2.457999 |
| ACC                                                                                               | 0   | -9.349750      | -4.019188 | 0.0000      | 0.0000 | 1.994172            | 2.322732 |
| AMBUJACL                                                                                          | 0   | -10.53510      | -4.339840 | 0.0000      | 0.0000 | 1.944572            | 2.215827 |

| Company<br>Symbol | Lag | ADF Test-Stat. |           | Probability |        | Durbin-Watson Stat. |          |
|-------------------|-----|----------------|-----------|-------------|--------|---------------------|----------|
|                   |     | Rtn.           | Vol.      | Rtn.        | Vol.   | Rtn.                | Vol.     |
| ACL               | 0   | -11.45685      | -8.111356 | 0.0000      | 0.0000 | 1.994442            | 2.050419 |
| AGIL              | 0   | -9.093432      | -8.519631 | 0.0000      | 0.0000 | 1.969102            | 2.042938 |
| AIGL              | 0   | -9.337435      | -5.701543 | 0.0000      | 0.0000 | 2.045400            | 2.260481 |
| ASCL              | 0   | -9.510235      | -3.448599 | 0.0000      | 0.0000 | 2.137951            | 1.956345 |
| BCL               | 0   | -7.796065      | -7.200186 | 0.0000      | 0.0000 | 1.897000            | 2.161122 |
| BIRLAC            | 0   | -8.879443      | -5.557245 | 0.0000      | 0.0000 | 1.998153            | 2.371298 |
| BGWL              | 0   | -10.02915      | -7.375190 | 0.0000      | 0.0000 | 1.989792            | 2.166149 |
| CUL               | 0   | -9.098912      | -7.054698 | 0.0000      | 0.0000 | 2.015560            | 2.327370 |
| CT&IL             | 0   | -9.623602      | -5.742449 | 0.0000      | 0.0000 | 2.008621            | 2.329239 |
| CDL               | 0   | -8.007234      | -5.682833 | 0.0000      | 0.0000 | 1.947538            | 2.300397 |
| DECCAN            | 0   | -9.620357      | -4.015967 | 0.0000      | 0.0000 | 1.998881            | 2.179360 |
| EIL               | 0   | -9.444891      | -8.092158 | 0.0000      | 0.0000 | 2.019709            | 2.044031 |
| GIL               | 0   | -7.874201      | -6.768842 | 0.0000      | 0.0000 | 1.990800            | 2.231966 |
| GIL               | 0   | -9.139359      | -6.191215 | 0.0000      | 0.0000 | 1.989130            | 1.918430 |
| GNL               | 0   | -9.159345      | -7.421442 | 0.0000      | 0.0000 | 1.967703            | 2.096918 |
| GSCL              | 0   | -10.14396      | -7.286636 | 0.0000      | 0.0000 | 1.991672            | 2.134274 |
| HEGL              | 0   | -7.992937      | -7.157751 | 0.0000      | 0.0000 | 1.976768            | 2.110520 |
| HSIL              | 0   | -9.383703      | -8.051902 | 0.0000      | 0.0000 | 1.996121            | 2.076287 |
| HCIL              | 0   | -9.722578      | -6.944267 | 0.0000      | 0.0000 | 1.953573            | 2.071974 |
| IFGLR             | 0   | -10.52463      | -7.389241 | 0.0000      | 0.0000 | 2.004614            | 2.093683 |
| ICL               | 0   | -9.541778      | -4.294953 | 0.0000      | 0.0000 | 1.991528            | 2.381122 |
| IHPCL             | 0   | -9.775208      | 1.918430  | 0.0000      | 0.0000 | 2.009690            | 2.008136 |
| JKLC              | 0   | -9.045533      | -5.915379 | 0.0000      | 0.0000 | 2.001954            | 2.305428 |
| KCL               | 0   | -10.59581      | -5.857547 | 0.0000      | 0.0000 | 1.982177            | 2.018158 |
| KCS&IL            | 0   | -11.56700      | -8.993801 | 0.0000      | 0.0000 | 2.031653            | 2.048587 |
| LORG              | 0   | -11.38895      | -8.497902 | 0.0000      | 0.0000 | 1.980591            | 2.022126 |
| MM&GL             | 0   | -10.99645      | -5.065824 | 0.0000      | 0.0000 | 1.991320            | 2.289144 |
| MCL               | 0   | -9.660446      | -6.853305 | 0.0000      | 0.0000 | 2.016134            | 2.308181 |
| MANGLAMCL         | 0   | -9.667782      | -6.024282 | 0.0000      | 0.0000 | 2.015278            | 1.989433 |
| MCL               | 0   | -9.303939      | -9.801949 | 0.0000      | 0.0000 | 2.014349            | 2.018513 |
| NCLI              | 0   | -10.64388      | -5.563298 | 0.0000      | 0.0000 | 1.981119            | 2.507062 |

| Company<br>Symbol | Lag | ADF Test-Stat. |           | Probability |        | Durbin-Watson Stat. |          |
|-------------------|-----|----------------|-----------|-------------|--------|---------------------|----------|
|                   |     | Rtn.           | Vol.      | Rtn.        | Vol.   | Rtn.                | Vol.     |
| OCLI              | 0   | -8.356018      | -6.233323 | 0.0000      | 0.0000 | 2.005002            | 1.954071 |
| OAL               | 0   | -9.781142      | -6.132675 | 0.0000      | 0.0000 | 2.024493            | 2.100288 |
| OC&IL             | 0   | -10.70727      | -6.450316 | 0.0000      | 0.0000 | 1.996932            | 2.170457 |
| OP&IL             | 0   | -10.20304      | -6.421143 | 0.0000      | 0.0000 | 1.984307            | 2.238310 |
| PPL               | 0   | -11.48131      | -7.349456 | 0.0000      | 0.0000 | 2.034505            | 2.101283 |
| PCL               | 0   | -9.182583      | -5.303496 | 0.0000      | 0.0000 | 1.978721            | 2.303571 |
| RCL               | 0   | -10.83007      | -8.074909 | 0.0000      | 0.0000 | 2.003759            | 2.068247 |
| REL               | 0   | -8.359947      | -5.671534 | 0.0000      | 0.0000 | 1.968852            | 2.331440 |
| RAMCOIL           | 0   | -7.905140      | -7.366277 | 0.0000      | 0.0000 | 1.957045            | 1.952549 |
| RCL               | 0   | -10.83007      | -5.203600 | 0.0000      | 0.0000 | 2.003759            | 2.143050 |
| SB&TIL            | 0   | -11.02227      | -5.636165 | 0.0000      | 0.0000 | 2.002396            | 2.146220 |
| SCL               | 0   | -7.366996      | -7.304496 | 0.0000      | 0.0000 | 1.979446            | 2.269233 |
| SGSI              | 0   | -9.109149      | -7.289798 | 0.0000      | 0.0000 | 1.949323            | 2.079504 |
| SCL               | 0   | -8.856908      | -5.473364 | 0.0000      | 0.0000 | 1.968317            | 2.376545 |
| SDCC              | 0   | -9.100250      | -5.492270 | 0.0000      | 0.0000 | 2.007905            | 2.472558 |
| S&CL              | 0   | -9.549756      | -8.655252 | 0.0000      | 0.0000 | 1.996716            | 2.086150 |
| SSGL              | 0   | -10.41959      | -4.752311 | 0.0000      | 0.0000 | 2.003483            | 2.316228 |
| SSIL              | 0   | -11.22632      | -6.850915 | 0.0000      | 0.0000 | 1.986778            | 2.211789 |
| SCL               | 0   | -9.882413      | -6.301237 | 0.0000      | 0.0000 | 2.001047            | 2.145333 |
| SRD&J             | 0   | -9.927884      | -8.954844 | 0.0000      | 0.0000 | 1.995375            | 2.042930 |
| SDL               | 0   | -10.40219      | -7.855315 | 0.0000      | 0.0000 | 1.992333            | 2.115500 |
| SDE               | 0   | -11.86956      | -5.810941 | 0.0000      | 0.0000 | 1.994336            | 2.181817 |
| TITAN             | 0   | -9.516489      | -5.168762 | 0.0000      | 0.0000 | 2.058335            | 2.345693 |
| TRIVENIG          | 0   | -10.33272      | -8.620285 | 0.0000      | 0.0000 | 1.998604            | 2.040044 |
| VGL               | 0   | -7.653748      | -8.161838 | 0.0000      | 0.0000 | 1.938681            | 2.081837 |
| VIL               | 0   | -8.911611      | -7.759426 | 0.0000      | 0.0000 | 1.988442            | 2.070677 |
| VISAKAIL          | 0   | -10.54119      | -5.212939 | 0.0000      | 0.0000 | 1.991031            | 2.201994 |
| ANSALBL           | 0   | -9.714987      | -7.784578 | 0.0000      | 0.0000 | 1.996792            | 2.074998 |
| AH&CL             | 0   | -9.366207      | -6.165322 | 0.0000      | 0.0000 | 1.995283            | 2.396835 |
| AP&IL             | 0   | -8.983197      | -5.483748 | 0.0000      | 0.0000 | 2.012365            | 2.109241 |
| AF&HL             | 0   | -8.346343      | -9.174753 | 0.0000      | 0.0000 | 2.022001            | 2.018665 |

| Company Symbol | Lag | ADF Test-Stat. |           | Probability |        | Durbin-Watson Stat. |          |
|----------------|-----|----------------|-----------|-------------|--------|---------------------|----------|
|                |     | Rtn.           | Vol.      | Rtn.        | Vol.   | Rtn.                | Vol.     |
| DSKD           | 0   | -8.882261      | -6.960573 | 0.0000      | 0.0000 | 2.008080            | 2.222327 |
| HBED           | 0   | -10.10093      | -9.577922 | 0.0000      | 0.0000 | 1.991639            | 2.005354 |
| LH&CL          | 0   | -8.572722      | -4.983682 | 0.0000      | 0.0000 | 1.977080            | 2.140550 |
| PENINSULAL     | 0   | -8.171291      | -9.066311 | 0.0000      | 0.0000 | 1.935657            | 2.027548 |
| RDL            | 0   | -9.928792      | -6.615177 | 0.0000      | 0.0000 | 1.982340            | 2.131902 |
| RIL            | 0   | -11.91311      | -8.852667 | 0.0000      | 0.0000 | 2.003342            | 2.133584 |
| UNITECH        | 0   | -6.870917      | -4.801105 | 0.0000      | 0.0000 | 2.020356            | -4.80110 |

Sources: Self constructed table

Important Note: These critical values automatic taken by e-view software during testing Stationarity of time series data through e-view software.

The table 1.1 shows, ADF test statistic of all companies of Non-metal industry, Real Estate industry and Mining industry for the period of Jan. 2000 to Dec. 2010. On Lag 0, the ADF test statistic is less than the critical values (-2.586753, -1.943853, -1.614749 at 1%, 5% and 10% significant level, respectively), and p-value is also near to zero. We can conclude to reject  $H_0$ . This means the TQ and RTN series do not have a unit root problem and the TQ and RTN series is stationary series. And all the figures in the table for Durbin-Watson statistics is big and is around two that means the stock return and trading volume may not have serial correlation problem. Hence, stock return data series will be stationary. The computed ADF test statistic is smaller than the critical value at 1%, 5% and 10% significance level and the hypothesis is valid.

**Table 1.2**

| ADF Test Statistic of Trading Volume and Stock Return on Industries Level (Jan. 2000 to Dec. 2010) |     |                     |             |                          |
|----------------------------------------------------------------------------------------------------|-----|---------------------|-------------|--------------------------|
| Industries Name                                                                                    | Lag | ADF Test-Statistics | Probability | Durbin-Watson Statistics |
| RTN-MINING                                                                                         | 0   | -4.437876           | 0.0000      | 2.553429                 |
| RTN-NONMETAL                                                                                       | 0   | -8.337389           | 0.0000      | 2.000189                 |
| RTN-REAL                                                                                           | 0   | -5.219812           | 0.0000      | 2.178609                 |
| TQ-MINING                                                                                          | 0   | -3.451439           | 0.0007      | 2.751341                 |
| TQ-NONMETAL                                                                                        | 0   | -2.984109           | 0.0032      | 2.527638                 |
| TQ-REAL                                                                                            | 0   | -4.271605           | 0.0000      | 2.272656                 |

Sources: Self constructed table

The table 1.2 shows brief of ADF test statistic of all three industries for the period of Jan. 2000 to Dec. 2010. The TQ and RTN series has not a unit root problem and the TQ and RTN series is stationary series. And the all values

in the table for Durbin-Watson statistics is big and near to two that mean the stock return and trading volume may not have serial correlation problem. Hence, stock return data series will be stationary the computed ADF test statistic is smaller than the critical value at 1%, 5% and 10% significance level and the hypothesis is valid.

**Table 1.3**

| Results of Granger Causality Test of Trading Volume and Stocks Return at Industry Level (Jan. 2000 to Dec. 2010) |         |                   |         |                          |         |              |         |
|------------------------------------------------------------------------------------------------------------------|---------|-------------------|---------|--------------------------|---------|--------------|---------|
| Return Cause Vol.                                                                                                |         | Vol. Cause Return |         | Bi-directional Causation |         | No Causation |         |
| Industries                                                                                                       | F-stat. | Industries        | F-stat. | Industries               | F-stat. | Industries   | F-stat. |
| Nonmetal                                                                                                         | 5.75    |                   |         |                          |         | Mining       | .91     |
|                                                                                                                  |         |                   |         |                          |         | Real est.    | .75     |

Sources: Self constructed table

The table 1.3 shows the f-statistics are large and probability value is close to 0 in case of three industries these are Non-metal industry, except for H\_oof mining industry and real estate industry at 1%, 5%, 10% significance level. It implies that the contents mutually granger cause to each other for all three industries group and shows stock return cause traded quantity except for the mining industry and real-estate industry in which we found no causation between return and volume. To look at the causality between pairs of returns, granger causality test was conducted to discover which trading volume exerts stronger influence on the other. It studies the cause and effect relationship between volume and return. We test Null hypothesis for granger non causality that “return do not cause trading volume”. Accepting the null hypothesis implies that the return do not lead trading volume and this is consistent with the prediction. A similar hypothesis can test the reverse granger non causality from TQ to RTN. Trading volume is said to be granger-caused by return if return help in prediction of trading volume, or equivalently if coefficient on the lagged returns on stocks are statistically significant. Two way causation is the, return cause’s volume and volume cause return.

**Table 1.4**

| Result of Pair Wise Granger Causality Tests of Stock Return and Trading Volume at Firm Level (Jan. 2000 to Dec. 2010) |         |                   |         |                          |             |              |         |
|-----------------------------------------------------------------------------------------------------------------------|---------|-------------------|---------|--------------------------|-------------|--------------|---------|
| Return Cause Vol.                                                                                                     |         | Vol. Cause Return |         | Bi-directional Causation |             | No Causation |         |
| Industries                                                                                                            | F-stat. | Industries        | F-stat. | Industries               | F-stat.     | Industries   | F-stat. |
| PCL                                                                                                                   | 5.42    | CTIL              | 3.03    | KCL                      | 3.68(2.58*) | PENINSLA     | .13     |
| SCL                                                                                                                   | 10.94   | OAL               | 5.96    | MCL                      | 3.78(3.33*) | RDL          | .21     |

| Return Cause Vol. |         | Vol. Cause Return |         | Bi-directional Causation |              | No Causation |         |
|-------------------|---------|-------------------|---------|--------------------------|--------------|--------------|---------|
| Industries        | F-stat. | Industries        | F-stat. | Industries               | F-stat.      | Industries   | F-stat. |
| VISAKAIL          | 4.83    | REL               | 4.82    | SCL                      | 25.37(5.28*) | UNITECH      | .37     |
| ANSALBL           | 5.22    | RIL               | 7.04    |                          |              | VIL          | 1.49    |
| AHCL              | 6.88    | Return cause vol. |         |                          |              | LHCL         | .32     |
| APIL              | 7.04    | Industry          | F-stat. |                          |              | AFHL         | .75     |
| DSKD              | 5.13    | GIL               | 4.87    |                          |              | HBED         | .14     |
| CDL               | 5.13    | GNL               | 2.49    |                          |              | ACL          | 1.52    |
| DECAN             | 7.71    | GSCL              | 14.09   |                          |              | GMDC         | 2.21    |
| EIL               | 7.52    | PPL               | 7.56    |                          |              | GNRE         | .53     |
| GIL               | 16.15   | AIGL              | 4.11    |                          |              | ONGC         | 1.01    |
| HCIL              | 6.10    | CMRL              | 19.97   |                          |              | SESAG        | .29     |
| IFGLR             | 5.26    | HCIL              | 6.27    |                          |              | AMBUJAC      | .30     |
| IHPCL             | 54.74   | HOEC              | 9.00    |                          |              | ACL          | 1.00    |
| JKCL              | 7.68    | INSLCO            | 15.03   |                          |              | AGIL         | .30     |
| KCSIL             | 21.53   | OCCL              | 13.86   |                          |              | CUL          | 1.34    |
| LORG              | 4.46    | SETL              | 40.38   |                          |              | ICL          | 2.03    |
| MMGL              | 7.78    | MCL               | 9.60    |                          |              | RAMCOIL      | 1.48    |
| MNGLM             | 4.78    | NCIL              | 10.70   |                          |              | SDCC         | 1.92    |
| HSIL              | 3.73    | OCLI              | 11.05   |                          |              | SSGL         | .01     |
| HEGL              | 14.07   | OCLI              | 9.77    |                          |              | SDL          | 1.21    |
| SCL               | 4.23    | OPIL              | 2.53    |                          |              | TITAN        | 1.39    |
| SSIL              | 3.84    | SGSI              | 7.20    |                          |              |              |         |
| SCL               | 4.01    | SCL               | 6.09    |                          |              |              |         |
| SRDG              | 13.69   | SBTIL             | 14.64   |                          |              |              |         |
| SDE               | 7.24    | VGL               | 12.93   |                          |              |              |         |
| TRIVENIG          | 13.08   | RCL               | 12.31   |                          |              |              |         |
| RCL               | 6.03    |                   |         |                          |              |              |         |

Sources: Self constructed table

The table 1.4 shows, the causality between pairs of returns to discover which trading volume exerts stronger influence on the other granger causality test was conducted. It studies the cause and effect relationship between volume and returns. We test Null hypothesis for granger non causality that “return do not cause trading volume”. Accepting the null

hypothesis implies that the return do not lead volume. A similar hypothesis can test the reverse granger non causality from TQ to RTN. Two way causation, return cause's volume and volume cause return. The result of granger causality test, F-test at firm level are reported in the table, firms of these industries are Non-metal industry, Real Estate industry and Mining industry (see table 1.4) from Jan. 2002 to Dec. 2010. Out of 81 stock, 51 stocks shows that return cause volume, 4 stocks display that volume cause return, 3 stocks indicate bi-directional causation and the remaining 23 shows no causation at all. As we can see, F-statistics are large and probability values are all close to 0 except for some companies. It shows the variables mutually granger cause each other except some companies whose F-statistics are not large and probability values are not all close to 0.

## CONCLUSION

From analysis result and discussions, we can say that the empirical result of granger causality test on three industries level in India, in these industries non-metal industry shows Return cause volume and remaining two industries shows no causation. Hence, we can say that only one industry show causation. It means that the variables trading volume and stock return strongly mutually granger cause each other in this industry, in case of empirical analysis of two selected industries of India. Hence, changes in returns and volume do reflect variable each other on non-metal industry but not in mining and real estate. Therefore, there is no randomness in the behaviour of return and volume changes in this study of non-metal industry in India. But in case of empirical analysis of three industries at firm level, the result shows moderate degree relationship between return and volume of all 81 companies from non-metal, real estate and mining industries.

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## APPENDIX

| SAMPLE OF STUDY                  |          |           |
|----------------------------------|----------|-----------|
| 1. Cochin Mineral& Rutile Ltd    | CM&RL    | Mining    |
| 2. Gujarat Mineral Dev. Co. Ltd  | GMDC     | "         |
| 3. Gujarat N R E Coke Ltd.       | GNRE     | "         |
| 4. Himadri Chemical & Ind. Ltd   | HC&IL    | "         |
| 5. Hindustan Oil Explor. Co Ltd  | HOEC     | "         |
| 6. Insilco Ltd.                  | INSILCO  | "         |
| 7. Oil & Natural Gas Corpn. Ltd  | ONGC     | "         |
| 8. Oriental Carbon & Chem. Ltd   | OC&CL    | "         |
| 9. Selan Exploration Tech. Ltd   | SETL     | "         |
| 10. Sesa Goa Ltd.                | SESAG    | "         |
| 11. A C C Ltd                    | ACC      | Non-metal |
| 12. Ambuja Cements Ltd.          | AMBUJACL | "         |
| 13. Andhra Cements Ltd.          | ACL      | "         |
| 14. Aro Granite Inds. Ltd.       | AGIL     | "         |
| 15. Asahi India Glass Ltd.       | AIGL     | "         |
| 16. Asian Star Co. Ltd.          | ASCL     | "         |
| 17. Bell Ceramics Ltd.           | BCL      | "         |
| 18. Birla Corporation Ltd.       | BIRLAC   | "         |
| 19. Borosil Glass Works Ltd.     | BGWL     | "         |
| 20. Carborundum Universal Ltd.   | CUL      | "         |
| 21. Century Textiles &Inds. Ltd. | CT&IL    | "         |
| 22. Classic Diamonds (India) Ltd | CDL      | "         |
| 23. Deccan Cements Ltd.          | DECCAN   | "         |
| 24. Everest Industries Ltd.      | EIL      | "         |
| 25. Goldiam International Ltd.   | GIL      | "         |
| 26. Graphite India Ltd.          | GIL      | "         |
| 27. Grindwell Norton Ltd.        | GNL      | "         |
| 28. Gujarat Sidhee Cement Ltd.   | GSCL     | "         |
| 29. H E G Ltd.                   | HEGL     | "         |
| 30. H S I L Ltd.                 | HSIL     | "         |
| 31. Heidelberg Cement India Ltd. | HCIL     | "         |

|                                 |            |   |
|---------------------------------|------------|---|
| 32. I F G L Refractories Ltd.   | IFGLR      | " |
| 33. India Cements Ltd.          | ICL        | " |
| 34. Indian Hume Pipe Co. Ltd.   | IHPCL      | " |
| 35. J K Lakshmi Cement Ltd.     | JKLC       | " |
| 36. Kajaria Ceramics Ltd.       | KCL        | " |
| 37. KakatiyaCeSugar&Ind Ltd     | KCS&IL     | " |
| 38. La Opala R G Ltd.           | LORG       | " |
| 39. MadhavMarble&Granite Ltd    | MM&GL      | " |
| 40. Madras Cements Ltd.         | MCL        | " |
| 41. Mangalam Cement Ltd.        | MANGALAMCL | " |
| 42. Murudeshwar Ceramics Ltd.   | MCL        | " |
| 43. N C L Industries Ltd.       | NCLI       | " |
| 44. O C L India Ltd.            | OCLI       | " |
| 45. Orient Abrasives Ltd.       | OAL        | " |
| 46. Orient Ceramics &Inds. Ltd. | OC&IL      | " |
| 47. Orient Paper &Inds. Ltd.    | OP&IL      | " |
| 48. Parekh Platinum Ltd.        | PPL        | " |
| 49. Prism Cement Ltd.           | PCL        | " |
| 50. Rain Commodities Ltd.       | RCL        | " |
| 51. Rajesh Exports Ltd.         | REL        | " |
| 52. Ramco Industries Ltd.       | RAMCOIL    | " |
| 53. Regency Ceramics Ltd.       | RCL        | " |
| 54. S B & T International Ltd.  | SB&TIL     | " |
| 55. Sagar Cements Ltd.          | SCL        | " |
| 56. Saint-Gobain SekuriInd Ltd  | SGSI       | " |
| 57. Shree Cement Ltd.           | SCL        | " |
| 58. Shree DigvijayCem. Co Ltd   | SDCC       | " |
| 59. Shrenuj& Co. Ltd.           | S&CL       | " |
| 60. Shyam Star Gems Ltd.        | SSGL       | " |
| 61. Silver Smith India Ltd.     | SSIL       | " |
| 62. Somany Ceramics Ltd.        | SCL        | " |
| 63. Su-Raj Diamond&Jewllr Ltd   | SRD&J      | " |
| 64. Suashish Diamonds Ltd.      | SDL        | " |

|                                   |             |             |
|-----------------------------------|-------------|-------------|
| 65. Sunraj Diamond Exports Ltd.   | SDE         | "           |
| 66. Titan Industries Ltd.         | TITAN       | "           |
| 67. Triveni Glass Ltd.            | TRIVENIG    | "           |
| 68. Vaibhav Gems Ltd.             | VGL         | "           |
| 69. Vesuvius India Ltd.           | VIL         | "           |
| 70. Visaka Industries Ltd.        | VISAKAIL    | "           |
| 71. Ansal Buildwell Ltd           | ANSALBL     | Real estate |
| 72. Ansal Housing & Const. Ltd    | AH&CL       | "           |
| 73. Ansal Properties &Infrast Ltd | AP&IL       | "           |
| 74. ArihantFound.&Housing Ltd     | AF&HL       | "           |
| 75. D S Kulkarni Developers Ltd.  | DSKD        | "           |
| 76. H B Estate Developers Ltd.    | HBED        | "           |
| 77. Lok Housing& Construct Ltd    | LH&CL       | "           |
| 78. Peninsula Land Ltd.           | PENINSULALL | "           |
| 79. Radhe Developers (India) Ltd  | RDL         | "           |
| 80. Rajeswari Infrastructure Ltd. | RIL         | "           |
| 81. Unitech Ltd.                  | UNITECH     | "           |