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# FUTURE CLOSING PRICE, TRADING VOLUME AND OPEN INTEREST: EVIDENCE FROM STOCK FUTURES & INDEX FUTURES OF NIFTY 50 ON NSE IN INDIA

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#### **ABSTRACT**

Futures are standardized contract between two parties to buy or sell an asset at a certain time in the future at a certain price. Open Interest is the total number of outstanding contracts that are held by market participants at the end of the day. Open interest applies primarily to the futures market. Open interest, or the total number of open contracts on a security, is often used to confirm trends and trend reversals for futures and options contracts. Open interest measures the flow of money into the futures market. For each seller of a futures contract there must be a buyer of that contract. Thus a seller and a buyer combine to create only one contract. Increasing open interest means that new money is flowing into the marketplace. The result will be that the present trend (up, down or sideways) will continue. Technical analysis can easily see that the volume represents a measure of intensity or pressure behind a price trend. The greater the volume, the more we can expect the existing trend to continue rather than reverse. This paper makes an attempt to study the relationship between future closing prices, trading volume and open interest for Nifty Index and select 25 Stocks on Nifty 50 Index for near month contracts. Open interest is often used to know the trends and flow of money, the relationship between these three often indicates the change of trend in the futures market.

#### **KEYWORDS**

futures closing price, trading volume, open interest, granger causality, co-integration.

#### INTRODUCTION

erivatives trading in India commenced in June 2000. NSE started operations in the derivatives segment on June 12, 2000. Initially, NSE introduced futures contracts on S&P CNX Nifty Index. However, the basket of instruments has widened considerably. Futures markets were designed to solve the problems that exist in forward markets. A futures contract is an agreement between two parties to buy or sell an asset at a certain time in the future at a certain price. But unlike forward contracts, the futures contracts are standardized and exchange traded. To facilitate liquidity in the futures contracts, the exchange specifies certain standard features of the contract. A futures contract may be offset prior to maturity by entering into an equal and opposite transaction. More than 99% of futures transactions are offset this way. The effective use of futures contract in hedging decisions has become focus and centre of debate on finding out an optimal hedge ratio and hedging effectiveness in empirical financial research. Financial media regularly reports daily trading activities to the stock markets. The information content of this data in terms of volatilities of price, trading volume and market depth has long attracted the attention of many researchers, policy makers and investors, to examine if there is any relationship between these variables and the types of relationship that exist between these variables. Trading volume offers useful information for practitioners and investors in investment decisions, as well as for researchers and policy makers in testing the theories of financial economics. The contemporaneous relation between price movements, trading volume and open interest on financial markets keeps attracting the attention of many financial economics (K. Srinivasana, 2010).

# LITERATURE REVIEW

TankDoğru, ÜmitBulut International (2012), "The Price-Volume Relation in the Turkish Derivatives Exchange" the paper examined the relation between closing prices and trading volume of US Dollar (USD) futures contracts in the Turkish Derivatives Exchange (TURKDEX). The data set comprised of daily closing prices & volume from 2009 to 2011. The results indicated that there is no relation between prices and volume in the short run, there is a relation from volume to prices in the long run.

Christos Floros (2001) "The Relationship between Trading Volume, Returns and Volatility: Evidence from the Greek Futures Markets" this paper investigated the contemporaneous and dynamic relationships between trading volume, returns and volatility for Greek index futures (FTSE/ASE-20 and FTSE/ASE Mid 40) taking data of Daily closing prices and volume for FTSE/ASE-20 index Sept. 1997-August 2001. For FTSE/ASE Mid 40 index, the daily closing prices and trading volume Dec. 1999- August 2000 and used OLS, GARCH, Granger Causality, GMM models. The conclusions drawn were for FTSE/ASE-20, price volatility does not significantly impact volume's volatility, and also, we conclude that a contemporaneous relationship does not hold. The dynamic models show a bi-directional Granger causality (feedback) between volume and actual returns. However, for FTSE/ASE Mid 40, the results indicate that returns do notGranger cause volume and vice versa.

Jonathan M. Karpoff (1987) "The Relation between Price Changes & Trading Volume: A Survey" this paper reviewed previous & current research on the relation between price changes & trading volume in financial markets and drawn various conclusions regarding each studies and a general conclusion drawn was that volume is positively related to the magnitude of the price change.

K. Srinivasana, (2010), "An Analysis of Price Volatility, Trading Volume and Market depth in Futures Market in India", this paper studied the conceptual framework of derivatives market in India and assessed the dynamic relationship between price volatility, trading volume and market depth for selected stock futures contracts and also to identify a suitable model to forecast volatility for stock futures contracts in India. The study was done for a period from Jan 2003 to Dec 2008 comprising of 25 stock futures contracts on NSE using ARCH and GARCH models. The study concluded that volatility is a part and parcel of capital market and have a major effect in derivatives market fluctuations and is due to the other key determining factors like inflow of foreign capital into the country, Exchange Rate, Balance of Payment and Interest Rates. It further draws out stating that there is a significant positive relationship between return volatility, expected trading volume and expected open interest. Unexpected volume and open interest have a greater impact on volatility from the expected trading volume and open interest whereas the Market depth does not have any effect on volatility.

Gulati Deepti (2012), "Relationship between Price and Open Interest in Indian Futures Market: An Empirical Study "this paper examined the relationship between closing price and open interest in Indian stock index futures market considering a sample of Indices BANKNIFTY, MINIFTY, CNXIT, NIFTY and NIFTYMIDCAP50 for a period 2009-10 & 2010-11 using statistical tool Granger Causality and concluded that one can use the information of open interest to predict future prices in the long run.

Toshiaki Watanabe (2001), "Price volatility, Trading Volume, and Market Depth: Evidence from the Japanese Stock Index Futures Market", this paper examined the relation between price volatility, trading volume and open interest for the Nikkei 225 stock index futures traded on the Osaka Securities Exchange (OSE) for a period of 24 August 1990, to 30 December 1997 using Descriptive statistics & ADF test. The conclusions drawn were a significant positive relation between volatility and unexpected volume and a significant negative relation between volatility, and expected open interest. However, no relation between price volatility, volume and open interest is found for the period prior to 14 February 1994, when the regulation increased gradually. This result provides evidence that the relation between price volatility, volume and open interest may vary with the regulation.

Stéphane M. Yen & Ming-Hsiang Chen (2010)"Open interest, Volume, and Volatility: Evidence from Taiwan Futures Markets "examine the relationships amongst volatility, total trading volume (TVOL) and total open interest (TOI) for three Taiwan stock index futures markets for a period July 21, 1998 to December 31, 2007 using GARCH and concluded that a significant in-sample relationships amongst the futures' daily volatilities, the lagged total volume and the lagged total open interest. Whether addition of lagged total volume and/or lagged total open interest helps the basic GARCH models predict future volatility depends upon the sample period examined for all three sets of futures.

Jonathan M. Karpoff (1987) "The Relation between Price Changes & Trading Volume: A Survey" this paper reviewed previous & current research on the relation between price changes & trading volume in financial markets and drawn various conclusions regarding each studies and a general conclusion drawn was that volume is positively related to the magnitude of the price change.

#### RESEARCH METHODOLOGY

The analysis is conducted for Nifty 50 Index & 25 select stocks on NIFTY 50 Index traded on NSE India for a period from April 2005 to December 2015 considering the inclusions and exclusions from the Nifty 50 Index constituents during the study period, using various tools to achieve the objective. In order to help in comparative analysis the period of study is kept uniform from  $1^{st}$  April 2005 to  $31^{st}$  December 2015. The sample used in this study includes daily future close prices, trading volume & open interest as major components or determinants in futures market for Nifty Index & 25 select stocks traded on NSE (www.nseindia.com). Since most of the trading activity takes place in near month contracts, only near month contracts are examined. All the values are converted to natural logarithm, calculated as  $R_t = LN(P_t / P_{t-1})$  where  $P_t$  and  $P_{t-1}$  are natural logarithms on day t and t-1 respectively to prevent non-stationarity, to achieve accurate results for the test incorporated.

**TABLE 1: DESCRIPTION OF SAMPLE** 

| INDEX & STOCKS | NIFTY 50                                     |                          |            |
|----------------|--|--------------------------|------------|
|                | Company Name                                 | Industry                 | Symbol     |
|                | ACC Ltd.                                     | CEMENT & CEMENT PRODUCTS | ACC        |
|                | Ambuja Cements Ltd.                          | CEMENT & CEMENT PRODUCTS | AMBUJACEM  |
|                | Bank of Baroda                               | FINANCIAL SERVICES       | BANKBARODA |
|                | Bharat Heavy Electricals Ltd.                | INDUSTRIAL MANUFACTURING | BHEL       |
|                | Bharat Petroleum Corporation Ltd.            | ENERGY                   | BPCL       |
|                | Cipla Ltd.                                   | PHARMA                   | CIPLA      |
|                | GAIL (India) Ltd.                            | ENERGY                   | GAIL       |
|                | HCL Technologies Ltd.                        | IT                       | HCLTECH    |
|                | Housing Development Finance Corporation Ltd. | FINANCIAL SERVICES       | HDFC       |
|                | HDFC Bank Ltd.                               | FINANCIAL SERVICES       | HDFCBANK   |
|                | Hero MotoCorp Ltd.                           | AUTOMOBILE               | HEROMOTOCO |
|                | Hindalco Industries Ltd.                     | METALS                   | HINDALCO   |
|                | Hindustan Unilever Ltd.                      | CONSUMER GOODS           | HINDUNILVR |
|                | ICICI Bank Ltd.                              | FINANCIAL SERVICES       | ICICIBANK  |
|                | Infosys Ltd.                                 | IT                       | INFY       |
|                | ITC Ltd.                                     | CONSUMER GOODS           | ITC        |
|                | Mahindra & Mahindra Ltd.                     | AUTOMOBILE               | M&M        |
|                | Maruti Suzuki India Ltd.                     | AUTOMOBILE               | MARUTI     |
|                | Oil & Natural Gas Corporation Ltd.           | ENERGY                   | ONGC       |
|                | Reliance Industries Ltd.                     | ENERGY                   | RELIANCE   |
|                | State Bank of India                          | FINANCIAL SERVICES       | SBIN       |
|                | Tata Motors Ltd.                             | AUTOMOBILE               | TATAMOTORS |
|                | Tata Power Co. Ltd.                          | ENERGY                   | TATAPOWER  |
|                | Tata Steel Ltd.                              | METALS                   | TATASTEEL  |
|                | Tata Consultancy Services Ltd.               | IT                       | TCS        |
| DATA VARIABLES | FUTURES CLOSE PRICES                         |                          |            |
|                | TRADING VOLUME                               |                          |            |
|                | OPEN INTEREST                                |                          |            |
| PERIOD         | APRIL, 2005 TO DECEMBER 2015                 |                          |            |
| TOOLS          | DESCRIPTIVE STATISTICS                       |                          |            |
|                | UNIT ROOT TEST                               |                          |            |
|                | GRANGER CAUSALITY                            |                          |            |
|                | CO-INTEGRATION                               |                          |            |
|                | VECTOR ERROR CORRECTION                      |                          |            |
|                |  |                          |            |

#### **OBJECTIVE**

To assess the relationship between Future Close Price, Trading Volume and Open Interest for select Stock Index Futures & Stock Futures in India.

#### **HYPOTHESIS**

H0: There is no significant relationship between future close price, trading volume and open interest.

H1: There is significant relationship between future close price, trading volume and open interest.

#### **DATA ANALYSIS & INTERPRETATION**

#### **DESCRIPTIVE STATISTICS**

To assess the relationship between future close price, trading volume and open interest we calculate daily log-returns of the NIFTY stock Index and the select 25 stocks based on its daily future close price, trading volume and open interest during 1st April 2005 to 31st Dec. 2015. To know the distribution pattern and also the

performance of the stocks descriptive analysis of future prices, volume and open interest is examined. The descriptive statistics of future close prices, trading volume and open interest is summarised in the below table 1.2 in terms of mean, standard deviation, Skewness, Kurtosis and Jarque Bera for Nifty 50 Index and select 25 stocks for the period from 1st Apr. 2005 to 31st Dec., 2015.

TABLE 2: DESCRIPTIVE STATISTICS OF LOG FUTURE CLOSE PRICE (LNFCL)

|            | Mean      | Std. Dev. | Skewness | Kurtosis | Jarque-Bera | Prob. | Obs  |
|------------|-----------|-----------|----------|----------|-------------|-------|------|
| ACC        | 0.000495  | 0.021327  | -0.37702 | 8.171455 | 3037.38     | 0     | 2669 |
| AMBUJACEM  | -0.00027  | 0.045586  | -33.6615 | 1509.123 | 2.53E+08    | 0     | 2669 |
| BANKBARODA | -0.00013  | 0.040924  | -23.1398 | 920.5788 | 93870142    | 0     | 2669 |
| BHEL       | -0.00058  | 0.042624  | -22.3122 | 819.2022 | 74306883    | 0     | 2669 |
| BPCL       | 0.000332  | 0.027364  | -5.85755 | 157.921  | 2684320     | 0     | 2669 |
| CIPLA      | 0.000342  | 0.026352  | -17.3538 | 622.7336 | 42845723    | 0     | 2669 |
| GAIL       | 0.000199  | 0.023739  | -2.63006 | 54.03742 | 292754.5    | 0     | 2669 |
| HCLTECH    | 0.000302  | 0.032135  | -7.39226 | 165.5796 | 2963780     | 0     | 2669 |
| HDFC       | 0.00021   | 0.038564  | -25.8802 | 1068.587 | 1.27E+08    | 0     | 2669 |
| HDFCBANK   | 0.000255  | 0.037103  | -30.4198 | 1321.784 | 1.94E+08    | 0     | 2669 |
| HEROMOTOCO | 0.0006    | 0.019482  | 0.43559  | 8.927979 | 3992.366    | 0     | 2669 |
| HINDALCO   | -0.00104  | 0.053214  | -29.6213 | 1271.6   | 1.79E+08    | 0     | 2669 |
| HINDUNILVR | 0.0007    | 0.018351  | 0.373241 | 7.438357 | 2252.663    | 0     | 2669 |
| ICICIBANK  | -0.00017  | 0.041191  | -22.1308 | 863.7654 | 82614012    | 0     | 2669 |
| INFY       | -0.00026  | 0.030506  | -13.4926 | 308.3661 | 10450990    | 0     | 2669 |
| ITC        | -0.00053  | 0.056071  | -40.0418 | 1862.726 | 3.85E+08    | 0     | 2669 |
| MAHINDRA   | 0.000343  | 0.03037   | -8.73226 | 201.7414 | 4426443     | 0     | 2669 |
| MARUTI     | 0.000887  | 0.021347  | -0.12623 | 6.341993 | 1249.164    | 0     | 2669 |
| ONGC       | -0.00049  | 0.036324  | -23.5156 | 920.9992 | 93963760    | 0     | 2669 |
| RELIANCE   | 0.000217  | 0.02658   | -8.12283 | 216.8377 | 5114523     | 0     | 2669 |
| SBIN       | -0.00041  | 0.050314  | -35.114  | 1596.692 | 2.83E+08    | 0     | 2669 |
| TATAMOTORS | -3.56E-05 | 0.042239  | -22.8511 | 898.3168 | 89376019    | 0     | 2669 |
| TATAPOWER  | -0.00063  | 0.051452  | -34.5541 | 1562.17  | 2.71E+08    | 0     | 2669 |
| TATASTEEL  | -0.00017  | 0.029492  | -0.28732 | 6.2517   | 1212.589    | 0     | 2669 |
| TCS        | 0.000195  | 0.028387  | -11.5283 | 291.1232 | 9291074     | 0     | 2669 |
| NIFTY50    | 0.000505  | 0.016255  | -0.13364 | 11.26912 | 7612.185    | 0     | 2669 |

Source: Computed Value.

The following significant observations can be made from the Table 2:

The mean returns of the future close prices of the stocks namely ACC, BPCL, CIPLA, GAIL, HECLTECH, HDFC, HDFCBANK, HEROMOTOCORP, HINDULVR, MAHINDRA, MARUTI, RELIANCE, TCS & NIFTY INDEX are positive which implies the price series had increased and that of AMBUJACEM, BANKBARODA, BHEL, HINDALCO, ICICIBANK, INFOSYS, ITC, ONGC, SBI, TATAMOTORS, TATAPOWER & TATASTEEL are negative implies that the price series had decreased over the period from April 2005 to December 2015. The volatile nature of the stocks is evident from the statistics on standard deviation of daily future close price returns. The least volatile stock is HINDULVR with standard deviation of 0.018351 & NIFTY50 Index with 0.016255. The highest standard deviation is observed in the ITC with 0.056071 indicating the most highly volatile stock in terms of the future close prices. Negatively skewed implies that the return distribution of stock futures have a heavier tail of larger values and hence a higher probability of earning higher returns for all the stocks except for HEROMOTOCORP & HINDULVR having positive skewness which means there are higher chances of generating lower returns. Kurtosis value exceeds 3, showing a leptokurtic curve indicates that the unconditional return distributions are not normal. JB test confirms that the normality is rejected at p-value of almost 1% level of significance.

TABLE 3: DESCRIPTIVE STATISTICS OF LOG TRADING VOLUME (LNTV)

|            | Mean      | Std. Dev. | Skewness | Kurtosis | Jarque-Bera | Prob. | Obs  |
|------------|-----------|-----------|----------|----------|-------------|-------|------|
| ACC        | -8.20E-06 | 0.535492  | 0.226724 | 8.528396 | 3421.744    | 0     | 2669 |
| AMBUJACEM  | -0.00016  | 0.555662  | 0.241716 | 8.605629 | 3520.498    | 0     | 2669 |
| BANKBARODA | 0.000558  | 0.560997  | 0.397996 | 10.88676 | 6987.725    | 0     | 2669 |
| BHEL       | 4.94E-05  | 0.519867  | 0.368069 | 10.37367 | 6106.781    | 0     | 2669 |
| BPCL       | 0.000275  | 0.562395  | 0.229893 | 8.914608 | 3913.864    | 0     | 2669 |
| CIPLA      | 0.000275  | 0.521118  | 0.405335 | 7.178353 | 2014.63     | 0     | 2669 |
| GAIL       | 0.000305  | 0.54108   | 0.349572 | 8.594088 | 3534.492    | 0     | 2669 |
| HCLTECH    | 9.85E-05  | 0.567062  | 0.169887 | 8.619884 | 3525.142    | 0     | 2669 |
| HDFC       | 0.00099   | 0.499458  | 0.159323 | 11.85359 | 8728.47     | 0     | 2669 |
| HDFCBANK   | 0.000842  | 0.479826  | 0.247424 | 15.82275 | 18312.44    | 0     | 2669 |
| HEROMOTOCO | 0.000415  | 0.581379  | 0.207617 | 9.358389 | 4515.229    | 0     | 2669 |
| HINDALCO   | 0.000325  | 0.48984   | 0.305205 | 10.15415 | 5733.287    | 0     | 2669 |
| HINDUNILVR | 0.000425  | 0.567436  | 0.442967 | 9.778887 | 5197.676    | 0     | 2669 |
| ICICIBANK  | 0.000328  | 0.45513   | 0.071896 | 12.29443 | 9609.186    | 0     | 2669 |
| INFY       | -0.00016  | 0.491129  | 0.389083 | 9.248138 | 4408.829    | 0     | 2669 |
| ITC        | 0.000315  | 0.514091  | 0.407017 | 10.00985 | 5538.248    | 0     | 2669 |
| MAHINDRA   | 0.000132  | 0.507559  | 0.046215 | 11.701   | 8420.248    | 0     | 2669 |
| MARUTI     | 0.000134  | 0.516561  | 0.331866 | 7.383649 | 2186.013    | 0     | 2669 |
| ONGC       | -9.69E-05 | 0.493238  | -0.04483 | 8.16748  | 2970.473    | 0     | 2669 |
| RELIANCE   | 6.62E-05  | 0.427935  | 0.109813 | 11.35279 | 7764.273    | 0     | 2669 |
| SBIN       | 6.65E-05  | 0.459578  | 0.207083 | 13.627   | 12578.19    | 0     | 2669 |
| TATAMOTORS | 3.26E-05  | 0.451079  | 0.160761 | 10.67715 | 6565.966    | 0     | 2669 |
| TATAPOWER  | 2.06E-05  | 0.547282  | 0.352504 | 8.468149 | 3380.477    | 0     | 2669 |
| TATASTEEL  | -0.00033  | 0.43702   | 0.216524 | 13.78314 | 12951.73    | 0     | 2669 |
| TCS        | 1.89E-05  | 0.495936  | 0.117446 | 9.823744 | 5184.383    | 0     | 2669 |
| NIFTY50    | -4.57E-06 | 0.391216  | 0.191517 | 15.82388 | 18304.74    | 0     | 2669 |

Source: Computed Value.

The following significant observations can be made from the Table 3:

The mean of the trading volume series of the stocks have positive means except for stocks namely ACC, AMBIJACEM, INFOSYS, ONGC, TATASTEEL & NIFTY50 Index having negative mean indicating lower trading volume. The volatile nature of the stocks is evident from the statistics on standard deviation of daily trading volume. The highest standard deviation is observed in HEROMOTOCORP with 0.581379 standard deviation in its daily trading volume and the lowest volatile in trading volume in REIANCE WITH 0.427935 standard deviation and the least in NIFTY50 index with 0.391216 standard deviation. Negatively skewed implies that the return distribution of stock futures have a heavier tail of larger values and hence a higher probability of earning higher trading volume for ONGC stock and rest all the stocks having positive skewness indicating lower trading volume. Kurtosis value exceeds 3, showing a leptokurtic curve indicates that the unconditional return distributions are not normal. JB test confirms that the normality is rejected at p-value of almost 1% level of significance.

TABLE 4: DESCRIPTIVE STATISTICS OF LOG OPEN INTEREST (LNOI)

|            | 14000    | Ctd Day   | Charrenses | V. unha aia | James to Dane | Dunk  | Oha  |
|------------|----------|-----------|------------|-------------|---------------|-------|------|
|            | Mean     | Std. Dev. | Skewness   | Kurtosis    | Jarque-Bera   | Prob. | Obs  |
| ACC        | -0.00081 | 0.350468  | 2.555326   | 15.75862    | 21007.4       | 0     | 2669 |
| AMBUJACEM  | 5.72E-05 | 0.357414  | 2.779372   | 15.43037    | 20619.54      | 0     | 2669 |
| BANKBARODA | 0.000555 | 0.40432   | 3.102012   | 20.99252    | 40281.98      | 0     | 2669 |
| BHEL       | 0.000476 | 0.363999  | 2.975188   | 16.25741    | 23483.39      | 0     | 2669 |
| BPCL       | 0.000144 | 0.32788   | 2.491713   | 15.27158    | 19508.84      | 0     | 2669 |
| CIPLA      | -0.00067 | 0.354197  | 2.655858   | 16.04404    | 22059.44      | 0     | 2669 |
| GAIL       | -0.00057 | 0.272197  | 2.67606    | 17.17358    | 25526.26      | 0     | 2669 |
| HCLTECH    | 0.0001   | 0.303415  | 2.799059   | 18.15802    | 29036.99      | 0     | 2669 |
| HDFC       | 0.000527 | 0.298313  | 3.197138   | 18.96862    | 32904.73      | 0     | 2669 |
| HDFCBANK   | 0.000755 | 0.316858  | 3.418695   | 20.7166     | 40104.8       | 0     | 2669 |
| HEROMOTOCO | 0.000223 | 0.319232  | 3.006789   | 17.93393    | 28823.58      | 0     | 2669 |
| HINDALCO   | 0.001107 | 0.425079  | 2.987978   | 16.6811     | 24786.61      | 0     | 2669 |
| HINDUNILVR | -0.00095 | 0.324284  | 3.092947   | 16.76979    | 25341.31      | 0     | 2669 |
| ICICIBANK  | 0.000248 | 0.305722  | 3.214101   | 18.2706     | 30528.13      | 0     | 2669 |
| INFY       | 0.000254 | 0.301363  | 2.974793   | 16.85261    | 25276.82      | 0     | 2669 |
| ITC        | 0.000867 | 0.28579   | 3.103127   | 19.50013    | 34560.42      | 0     | 2669 |
| MAHINDRA   | -0.00023 | 0.330715  | 3.013795   | 18.82943    | 31905.98      | 0     | 2669 |
| MARUTI     | -0.00053 | 0.376441  | 2.842501   | 15.82001    | 21871.54      | 0     | 2669 |
| ONGC       | 0.000108 | 0.280175  | 3.082985   | 20.70021    | 39069.35      | 0     | 2669 |
| RELIANCE   | -0.00054 | 0.365008  | 2.987704   | 16.96566    | 25660.78      | 0     | 2669 |
| SBIN       | 0.000246 | 0.344187  | 2.900405   | 15.49684    | 21109.6       | 0     | 2669 |
| TATAMOTORS | 2.30E-05 | 0.356943  | 2.805331   | 14.92636    | 19318.85      | 0     | 2669 |
| TATAPOWER  | 0.000257 | 0.324334  | 2.772501   | 17.41993    | 26543.38      | 0     | 2669 |
| TATASTEEL  | -0.00053 | 0.396282  | 2.734421   | 14.45466    | 17917.61      | 0     | 2669 |
| TCS        | -0.00012 | 0.303754  | 2.798602   | 15.68787    | 21386.55      | 0     | 2669 |
| NIFTY50    | -0.00029 | 0.218197  | 3.213629   | 17.49824    | 27969.84      | 0     | 2669 |

Source: Computed Value.

The following significant observations can be made from the Table 4:

The mean of the open interest series of the stocks have positive means except for stocks namely ACC, CIPLA, GAIL, HINDULVR, MAHINDRA, MARUTI, RELIANCE, TATASTEEL, TCS & NIFTY50 Index having negative mean indicating that the stocks had lower open interest. The volatile nature of the stocks is evident from the statistics on standard deviation of daily open interest series. The highest standard deviation is observed in HINDALCO with 0.425079 standard deviation in its daily open interest and the lowest volatile open interest in GAIL with 0.272197 standard deviation and the least in NIFTY50 index with 0.218197 standard deviation. All the stocks are having positive skewness. Kurtosis value exceeds 3, showing a leptokurtic curve indicates that the unconditional return distributions are not normal. JB test confirms that the normality is rejected at p-value of almost 1% level of significance.

#### UNIT ROOT TEST:

#### **AUGMENTED DICKEY FULLER TEST**

This study uses the standard Augmented Dickey-Fuller test (ADF) to test whether the assumed time series is I (1) which is a necessary condition for the further testing procedure. First, test for the unit roots in the cases when intercept is present in the regression, then when there is intercept and trend, and finally without intercept and trend. If not able to reject the null Hypothesis about the unit root run the ADF on the first differences of the original time series. In this step, we can reject the null Hypothesis about the unit root in order to be able to conclude that the original time series are I (1). The data used for are daily future close prices, trading volume and open interest and covers for a period from 1st April 2005 to 31st December 2015. All the daily values are converted to natural logarithm, calculated as  $R_i = LN (P_1/P_{t-1})$  where  $P_1$  and  $P_{t-1}$  are natural logarithms on day t and t-1 respectively. The variables for the study after converting to natural logarithms the series are found to be stationary at levels and hence we reject the null concluding that the series has a unit root. Thus, the series are stationary since the null hypothesis is rejected that the data is non-stationary or has a unit root as represented in the table 5.

H₀- Has a unit root (i.e. the data is non-stationary)

H<sub>1</sub>- Does not have a unit root (i.e. the data is stationary)

|            |            | TABLE 5: ADF TEST         | RESULTS FO | R FUTURE CL | OSE PRICE, TRADING | <b>VOLUME &amp;</b> | <b>OPEN INTER</b> | REST              |            |
|------------|------------|---------------------------|------------|-------------|--------------------|---------------------|-------------------|-------------------|------------|
| COMPANY    |            | <b>FUTURE CLOSE PRICE</b> |            |             | TRADING VOLUME     |                     |                   | OPEN INTEREST     |            |
| /INDEX     | INTERCEPT  | TREND & INTERCEPT         | NONE       | INTERCEPT   | TREND & INTERCEPT  | NONE                | INTERCEPT         | TREND & INTERCEPT | NONE       |
| ACC        | -49.44427* | -49.45073*                | -49.42802* | -25.40015*  | -25.39709*         | -25.40495*          | -20.22992*        | -20.22561*        | -20.23093* |
| AMBUJACEM  | -53.17460* | -53.18925*                | -53.18269* | -20.22263*  | -20.21895*         | -20.22614*          | -18.44813*        | -18.46334*        | -18.44727* |
| BANKBARODA | -50.92400* | -50.94875*                | -50.93301* | -25.32045*  | -25.31574*         | -25.32414*          | -19.54850*        | -19.59323*        | -19.52876* |
| BHEL       | -49.80415* | -49.82187*                | -49.80461* | -21.03406*  | -21.04092*         | -21.03686*          | -22.06313*        | -22.05723*        | -22.01805* |
| BPCL       | -51.00927* | -51.00404*                | -51.01144* | -26.22229*  | -26.21742*         | -26.22648*          | -19.38395*        | -19.38503*        | -19.38089* |
| CIPLA      | -50.54330* | -50.53977*                | -50.54443* | -25.87468*  | -25.86991*         | -25.87913*          | -11.92826*        | -11.92129*        | -11.93025* |
| GAIL       | -53.82910* | -53.82450*                | -53.83524* | -20.21917*  | -20.21627*         | -20.22238*          | -17.94130*        | -17.95523*        | -17.94488* |
| HCLTECH    | -51.26471* | -51.25646*                | -51.26982* | -20.23175*  | -20.22731*         | -20.23552*          | -17.67669*        | -17.67196*        | -17.67522* |
| HDFC       | -51.65956* | -51.65341*                | -51.66772* | -20.84416*  | -20.86079*         | -20.83095*          | -19.08543*        | -19.09197*        | -19.05194* |
| HDFCBANK   | -51.36043* | -51.35435*                | -51.36765* | -21.26849*  | -21.28470*         | -21.25261*          | -14.77491*        | -14.77996*        | -14.71983* |
| HEROMOTOCO | -50.38299* | -50.37687*                | -50.34587* | -21.77134*  | -21.77245*         | -21.77331*          | -20.55861*        | -20.56055*        | -20.55939* |
| HINDALCO   | -51.39215* | -51.40389*                | -51.38235* | -25.93010*  | -20.96356*         | -25.93315*          | -19.67183*        | -19.76123*        | -14.85063* |
| HINDUNILVR | -51.67432* | -51.66463*                | -51.60887* | -20.90741*  | -20.90820*         | -20.91112*          | -21.61472*        | -21.63116*        | -21.60956* |
| ICICIBANK  | -49.88977* | -49.91406*                | -49.89833* | -21.83274*  | -21.84288*         | -21.83295*          | -19.08163*        | -19.08127*        | -19.06223* |
| INFY       | -52.20194* | -52.20519*                | -52.20778* | -25.03938*  | -25.03444*         | -25.04377*          | -18.98747*        | -18.98362*        | -18.98140* |
| ITC        | -51.51800* | -51.53465*                | -51.52308* | -21.38062*  | -21.37958*         | -21.38377*          | -15.34213*        | -15.39047*        | -15.32804* |
| MAHINDRA   | -48.91175* | -48.90294*                | -48.91500* | -21.86845*  | -21.86506*         | -21.87179*          | -19.75003*        | -19.74644*        | -19.75336* |
| MARUTI     | -49.36379* | -49.35789*                | -49.29166* | -20.03533*  | -20.03608*         | -20.03909*          | -20.44012*        | -20.43487*        | -20.44387* |
| ONGC       | -51.32418* | -51.31807*                | -51.32469* | -22.17596*  | -22.17266*         | -22.18008*          | -17.25163*        | -17.24617*        | -17.24861* |
| RELIANCE   | -50.59414* | -50.59995*                | -50.60032* | -21.15472*  | -21.15890*         | -21.15870*          | -15.76358*        | -15.76468*        | -15.76676* |
| SBIN       | -51.17824* | -51.22239*                | -51.18442* | -25.36065*  | -25.36008*         | -25.36534*          | -12.58881*        | -12.63073*        | -12.57239* |
| TATAMOTORS | -45.56743* | -48.55966*                | -48.57650* | -19.84336*  | -19.84069*         | -19.84701*          | -20.55966*        | -20.55492*        | -20.55666* |
| TATAPOWER  | -52.42049* | -52.43148*                | -52.42237* | -19.95400*  | -19.95161*         | -19.95764*          | -17.37814*        | -17.37764*        | -17.36776* |
| TATASTEEL  | -49.56544* | -49.56415*                | -49.57308* | -21.96474*  | -21.96053*         | -21.96777*          | -21.34337*        | -21.36506*        | -21.34762* |
| TCS        | -51.33602* | -51.34425*                | -51.34323* | -21.25762*  | -21.25354*         | -21.26159*          | -20.07205*        | -20.07661*        | -20.07542* |
| NIFTY50    | -50.78146* | -50.78380*                | -50.74270* | -26.21663*  | -26.22492*         | -26.22160*          | -20.62173*        | -20.63365*        | -20.62618* |

Source: Computed Value. Note: \* denotes rejection of null hypothesis at 5% level of significance

#### **GRANGER CAUSALITY TEST**

The procedure for testing statistical causality between future close prices, trading volume and open interest a direct "Granger-causality" test proposed by C. J. Granger in 1969 is used. Granger causality may have more to do with precedence, or prediction, than with causation in the usual sense. It suggests that while the past can cause/predict the future, the future cannot cause/predict the past. According to Granger, X causes Y if the past values of X can be used to predict Y more accurately than simply using the past values of Y. In other words, if past values of X statistically improve the prediction of Y, then we can conclude that X "Granger-causes" Y. To determine whether a cause and effect relationship exists between future close prices, trading volume and open interest the 8 lagged values have been used from the VAR Lag Order Selection Criteria. In case of Granger causality between the two variables, null hypothesis is rejected if the probability value is less than alpha (0.05).

 $H_{01}$ - Trading Volume does not granger cause Future Close Price

 $H_{02}$ - Future Close Price does not granger cause Trading Volume

H<sub>03</sub>- Open Interest does not granger cause Future Close Price H<sub>04</sub>- Future Close Price does not granger cause Open Interest

 $H_{0s}$ - Open Interest does not granger cause Open interest  $H_{0s}$ - Open Interest does not granger cause Trading Volume

H<sub>06</sub>- Trading Volume does not granger cause Open Interest

To select the lags VAR Lag Order Selection Criteria is used so that causality test is run using optimum lags of 8 for all stocks.

|               |      | TABI          | E 6: GRANGER  | CAUSALITY TEST | RESULTS       |              |              |
|---------------|------|---------------|---------------|----------------|---------------|--------------|--------------|
| COMPANY       | LAGS | LNTV -> LNFCL | LNFCL -> LNTV | LNOI -> LNFCL  | LNFCL -> LNOI | LNOI -> LNTV | LNTV -> LNOI |
| ACC           | 8    | 0.87600       | 0.96229       | 1.27730        | 1.193396      | 4.88061      | 2.25588      |
| ACC           | 0    | (0.5359)      | (0.4637)      | (0.2506)       | (0.2984)      | (5.E-06)*    | (0.0212)*    |
| AMBUJACEM     | 8    | 0.50221       | 1.07044       | 0.23488        | 1.96753       | 7.32736      | 2.76505      |
| AIVIBUJACEIVI | ٥    | (0.8554)      | (0.3808)      | (0.9845)       | (0.0467)*     | (1.E-09)*    | (0.0048)*    |
| BANKBARODA    | 8    | 2.40102       | 1.31690       | 1.43122        | 2.69714       | 5.30968      | 3.13318      |
| BAINNBANUDA   | ٥    | (0.0140)*     | (0.2300)      | (0.1781)       | (0.0059)*     | (1E-06)*     | (0.0016)*    |
| BHEL          | 8    | 0.27694       | 0.41900       | 0.92935        | 1.60358       | 5.66984      | 14.3556      |
| DHEL          | ٥    | (0.9736)      | (0.9102)      | (0.4907        | (0.1185)      | (4.E-07)*    | (1.E-20)*    |
| BPCL          | 8    | 1.07640       | 2.01943       | 2.49853        | 1.47506       | 2.10634      | 2.05129      |
| BFCL          | 0    | (0.3765)      | (0.0406)*     | (0.0106)*      | (0.1609)      | (0.0321)*    | (0.0373)*    |
| CIPLA         | 8    | 1.97148       | 1.47851       | 1.83609        | 2.35204       | 4.75999      | 0.79238      |
| CIPLA         | 8    | (0.0462)*     | (0.1596)      | (0.0660)       | (0.0161)*     | (8.E-06)*    | (0.6094)     |
| CAIL          | 8    | 0.97848       | 0.39780       | 0.35387        | 0.31639       | 3.18222      | 2.94172      |
| GAIL          | 8    | (0.4507)      | (0.9223)      | (0.9444)       | (0.9602)      | (0.0013)*    | (0.0028)*    |
| HOLTECH       |      | 0.62998       | 0.39574       | 2.12824        | 2.22376       | 6.26226      | 0.76542      |
| HCLTECH       | 8    | (0.7532)      | (0.9234)      | (0.0302)*      | (0.0232)*     | (5.E-08)*    | (0.6334)     |
|               | _    | 0.63315       | 1.37799       | 1.02976        | 2.38206       | 7.11389      | 3.29489      |
| HDFC          | 8    | (0.7505)      | (0.2009)      | (0.4109)       | (0.0148)*     | (2.E-09)*    | (0.0009)*    |
|               | _    | 0.81879       | 0.91320       | 0.48059        | 0.45578       | 8.86705      | 7.72059      |
| HDFCBANK      | 8    | (0.5859)      | (0.5042)      | (0.8707)       | (0.8874)      | (5.E-12)*    | (3.E-10)*    |
|               |      | 1.85624       | 0.80576       | 0.76149        | 2.93770       | 2.81814      | 4.45168      |
| HEROMOTOCO    | 8    | (0.0626)      | (0.5975)      | (0.6370)       | (0.0029)*     | (0.0041)*    | (2.E-05)*    |
|               |      | 1.17936       | 1.02161       | 3.63050        | 1.45610       | 6.47234      | 1.99115      |
| HINDALCO      | 8    | (0.3074)      | (0.4171)      | (0.0003)*      | (0.1682)      | (2.E-08)*    | (0.0438)*    |
|               |      | 1.66319       | 1.45719       | 0.66046        | 0.47284       | 4.17845      | 6.62238      |
| HINDUNILVR    | 8    | (0.1023)      | (0.1678)      | (0.7268)       | (0.8760)      | (6.E-05)*    | (1.E-08)*    |
|               |      | 0.77736       | 0.35577       | 2.57175        | 1.20922       | 4.95258      | 2.51326      |
| ICICIBANK     | 8    | (0.6228)      | (0.9435)      | (0.0085)*      | (0.2892)      | (4.E-06)*    | (0.0101)*    |
|               |      | 1.43499       | 0.48501       | 2.74565        | 1.97641       | 8.32323      | 1.68752      |
| INFY          | 8    | (0.1766)      | (0.8676)      | (0.0051)*      | (0.0456)*     | (3.E-11)*    | (0.0963)     |
|               |      | 1.67823       | 0.83769       | 1.12320        | 4.36115       | 2.78304      | 1.24084      |
| ITC           | 8    | (0.0986)      | (0.5692)      | (0.3439)       | (3.E-05)*     | (0.0046)*    | (0.2707)     |
|               |      | 0.59680       | 0.60468       | 3.35103        | 0.97113       | 3.11027      | 2.43893      |
| MAHINDRA      | 8    | (0.7813)      | (0.7747)      | (0.0008)*      | (0.4566)      | (0.0017)*    | (0.0126)*    |
|               |      | 1.12695       | 0.36833       | 1.31380        | 1.43540       | 3.30797      | 6.21823      |
| MARUTI        | 8    | (0.3414)      | (0.9376)      | (0.2316)       | (0.1764)      | (0.0009)*    | (5.E-08)*    |
|               |      | 1.38749       | 0.56186       | 3.92663        | 0.82005       | 5.89598      | 1.51142      |
| ONGC          | 8    | (0.1967)      | (0.8098)      | (0.0001)*      | (0.5848)      | (2.E-07)*    | (0.1478)     |
|               |      | 0.23528       | 0.64271       | 0.54408        | 0.85111       | 8.47813      | 3.55988      |
| RELIANCE      | 8    | (0.9844)      | (0.7422)      | (0.8239)       | (0.5575)      | (2.E-11)*    | (0.0004)*    |
|               |      | 1.18914       | 0.84973       | 0.41133        | 2.42117       | 10.2656      | 2.64491      |
| SBIN          | 8    | (0.3014)      | (0.5587)      | 0.9147)        | (0.0132)*     | (3.E-14)*    | (0.0069)*    |
|               |      | 0.88336       | 1.05992       | 0.20330        | 0.59096       | 5.21307      | 3.02438      |
| TATAMOTORS    | 8    | (0.5296)      | (0.3885)      | (0.9904)       | (0.7861)      | (2.E-06)*    | (0.0022)*    |
|               | -    | 0.45691       | 1.09727       | 0.38908        | 1.14243       | 2.90871      | 2.45096      |
| TATAPOWER     | 8    | (0.8867)      | (0.3618)      | (0.9270)       | (0.3311)      | (0.0031)*    | (0.0121)*    |
|               |      | 0.69792       | 1.28310       | 3.30496        | 0.43100       | 8.61865      | 2.09519      |
| TATASTEEL     | 8    |               |               |                |               |              |              |
|               |      | (0.6937)      | (0.2475)      | (0.0009)*      | (0.9031)      | (1.E-11)*    | (0.0331)*    |
| TCS           | 8    | 1.44022       | 0.94181       | 0.51530        | 1.09507       | 12.6793      | 1.54028      |
|               |      | (0.1745)      | (0.4804)      | (0.8458)       | (0.3633)      | (5.E-18)     | (0.1380)     |
| NIFTY50       | 8    | 0.63561       | 7.69739       | 1.57242        | 1.03338       | 13.0698      | 2.16599      |
|               |      | (0.7484)      | (3.E-10)*     | (0.1278)       | (0.4082)      | (1.E-18      | (0.0272)*    |

Source: Computed Value. Note: \* denotes rejection of null hypothesis at 5% level of significance

Table 6 represents the results from Granger Causality test for select 25 stocks and NIFTY50 Index. We reject the null hypothesis that there exists bidirectional causality for all the stocks from Open Interest to Trading Volume and Trading Volume to Open Interest except in case of HCLTECH, INFOSYS & ITC there exist a unidirectional causality from Open Interest to Trading Volume and for Nifty50 from Trading Volume to Open Interest. There is no causality for TCS stock from Trading Volume to Open Interest. There exists a unidirectional causality from Open Interest to Future Close Price except for ACC, HDFCBANK, HINDULVR, RELIANCE, TATAMOTORS, TATAPOWER, and TCS & NIFTY50. Bi-directional causality is being observed from Open Interest to Future Close Price for HCLTECH & INFOSYS. There exists no causality from Trading Volume to Future Close Price except for BANKBARODA from trading volume to future close price and for CIPLA & BPCL from Future Close Price to Trading Volume. Overall it can be concluded that there are high chances of predicting Open Interest from Trading Volume or vice-versa due to significant results from the causality test for almost all the stocks is evident.

#### **CO-INTEGRATION**

With the previous results of unit root tests, we have two *I* (1) variables. We can test whether there is a long-run relationship between Future close prices, trading volume and open interest. Co-integration test can be used to examine stable long-run relations between two or more variables. Co-integration means that one or more combination of the variables is stationary even though each variable is not. If we can reject the null hypothesis about the unit root, we can conclude that the variables are co-integrated of the orders CI (1). If there exists co-integration between variables, we can test short-run dynamics between two series within the framework of an error correction model.

To investigate the existence of a long-term relationship between real and financial variables, we explore existence of any significant long-run relationships among the variables in our model. If the real and financial variables are co-integrated with one another, then this will provide statistical evidence for the existence of a long-run relationship. Though, a set of economic series are not stationary, there may exist some linear combination of the variables which exhibit a dynamic equilibrium in the long run (Engle and Granger 1987).

Since the series of all the variables are integrated of same order, the Johansens's Co-integration test is used to examine the long run relationship and the results are summarised in the table 7.

 $H_0$ - there is no co-integration between Future Close Price, Trading Volume & Open Interest  $H_1$ - there is co-integration between Future Close Price, Trading Volume & Open Interest

| STOCK NO.DC (CI)   EIGENVALUE   TRACE STATISTIC   PROBABILITY  | T/           |           | ISEN CO-INTE | RATION RESULTS |         |
|--|--------------|-----------|--------------|----------------|---------|
| ACC  |              |           |              |                |         |
| AT MOST 1 0.021390 61.90758 0.0000° AT MOST 2 0.0016157 1.005674 7.276044 0.0000° AT MOST 2 0.0016157 1.005674 7.276044 0.00001° AT MOST 2 0.007422 19.84588 0.0000° D.0016 1.007150 1. |              |           |              |                |         |
| AMBUJACEM  |              |           |              |                |         |
| AT MOST 1  |              | AT MOST 2 | 0.001615     | 4.305711       | 0.0380* |
| BANKBARODA   NONE   0.007422   19.84588   0.0000*  | AMBUJACEM    | NONE      | 0.093350     | 333.8491       | 0.0001* |
| BANKBARODA   |              | AT MOST 1 | 0.019674     | 72.78044       | 0.0000* |
| AT MOST 1  |              | AT MOST 2 | 0.007422     | 19.84588       | 0.0000* |
| BHEL   | BANKBARODA   | NONE      | 0.061583     | 191.9182       | 0.0001* |
| BHEL   |              |           |              |                |         |
| AT MOST 1   0.022257   61.46569   0.0000*  |              |           |              |                |         |
| BPCL   | BHEL         |           |              |                |         |
| BPCL   |              |           |              |                |         |
| AT MOST 1 0.017101 48.00825 0.0000* AT MOST 2 0.000771 2.055812 0.1516  CIPLA NONE 0.087576 304.6935 0.0001* AT MOST 2 0.001085 2.891380 0.0000* AT MOST 2 0.001085 2.891380 0.0000* AT MOST 2 0.001085 2.891380 0.0001* AT MOST 2 0.001085 2.891380 0.0001* AT MOST 1 0.01165 5.067891 0.0000* AT MOST 2 0.002723 7.264793 0.0007* AT MOST 1 0.016165 5.067891 0.0000* AT MOST 1 0.026150 70.83714 0.0001* AT MOST 1 0.025150 70.83714 0.0000* AT MOST 2 0.000734 295.0346 0.0001* AT MOST 1 0.005774 169.4764 0.0001* AT MOST 2 0.001118 2.979565 0.0843  HDFC NONE 0.050774 169.4764 0.0001* AT MOST 1 0.009677 30.66045 0.0001* AT MOST 2 0.001181 34.754302 0.0292* HDFCBANK NONE 0.116181 342.6026 0.0001* AT MOST 1 0.003111 13.59150 0.0948 AT MOST 1 0.003111 13.59150 0.0948 AT MOST 2 0.001984 5.291357 0.0214* HEROMOTOCO NONE 0.111727 406.8214 0.0001* AT MOST 1 0.033310 91.20161 0.0000* AT MOST 2 0.000336 0.896278 0.3438 HINDALCO NONE 0.105207 128.4684 0.0001* AT MOST 1 0.035974 128.4684 0.0001* AT MOST 2 0.001984 0.00001* AT MOST 2 0.001984 0.00001* AT MOST 2 0.001985 0.00000* AT MOST 2 0.00036 0.896278 0.3438 HINDALCO NONE 0.055257 282.7167 0.0001* AT MOST 1 0.035974 128.4684 0.0001* AT MOST 1 0.035974 128.4684 0.0001* AT MOST 1 0.035974 128.4684 0.0001* AT MOST 1 0.037975 130.9168 0.0001* AT MOST 1 0.0079707 404.8178 0.0001* AT MOST 1 0.0079707 404.8178 0.0001* AT MOST 1 0.0079707 404.8178 0.0001* AT MOST 1 0.00396 7.394.1586 0.0000* AT MOST 2 0.002369 7.394.1586 0.00001* AT MOST 1 0.002369 7.394.1586 0.0000* AT MOST 2 0.002378 7.410052 0.00655* INFOSYS NONE 0.117687 394.1586 0.00001* AT MOST 1 0.002385 7.246049 0.00000* AT MOST 2 0.002369 3.853864 0.00001* AT MOST 1 0.002385 7.246049 0.00000* AT MOST 2 0.002369 3.853864 0.00001* AT MOST 1 0.002369 3.853866 0.00001* AT MOST 1 0.002385 7.246049 0.00000* AT MOST 2 0.002369 3.853866 0.0001* AT MOST 1 0.00238 61.13175 0.00001* AT MOST 1 0.00238 61.13175 0.00001* AT MOST 1 0.002386 61.33175 0.00001* AT MOST 1 0.00144 3.365.0457 0.00001* AT MOST 1 0.00144 3.365.0457 0.0001* AT MOST 1 0.0014 | PDCI         |           |              |                |         |
| AT MOST 2  | BPCL         |           |              |                |         |
| CIPLA  |              |           |              |                |         |
| AT MOST 1 0.021406 60.53549 0.0000* AT MOST 2 0.001083 363.6489 0.0001* AT MOST 1 0.016165 50.67891 0.0000* AT MOST 2 0.002723 7.264793 0.0000* AT MOST 1 0.016165 50.67891 0.00001* AT MOST 2 0.002723 7.264793 0.00001* AT MOST 1 0.025150 70.83714 0.00000* AT MOST 2 0.001118 2.979555 0.0843 AT MOST 2 0.00118 3.4754302 0.09292* AT MOST 1 0.009677 30.66045 0.0001* AT MOST 2 0.001783 4.754302 0.09292* AT MOST 1 0.009677 30.66045 0.0001* AT MOST 2 0.001383 4.754302 0.09924* AT MOST 1 0.003111 13.59150 0.0948 AT MOST 2 0.001984 5.291357 0.0214* AT MOST 2 0.001333 91.20161 0.00001* AT MOST 2 0.003330 91.20161 0.00001* AT MOST 2 0.003336 0.896278 0.3438 HINDALCO NONE 0.056257 282.7167 0.0001* AT MOST 1 0.033974 128.4684 0.0001* AT MOST 2 0.011520 30.86704 0.00001* AT MOST 2 0.011520 30.86704 0.00001* AT MOST 2 0.011520 30.86704 0.00001* AT MOST 1 0.037955 130.9168 0.0001* AT MOST 2 0.002778 404.8178 0.0001* AT MOST 2 0.002778 7.410052 0.00001* AT MOST 2 0.002778 7.410052 0.00000* AT MOST 2 0.002778 7.410052 0.00001* AT MOST 2 0.002778 7.410052 0.00001* AT MOST 2 0.002778 7.410052 0.00001* AT MOST 1 0.020173 60.60482 0.00000* AT MOST 1 0.020173 60.60482 0.00000* AT MOST 1 0.002178 7.246049 0.00000* AT MOST 1 0.002178 61.63846 0.0001* AT MOST 1 0.002178 60.60482 0.00000* AT MOST 1 0.002178 7.246049 0.00000* AT MOST 1 0.002173 60.60482 0.00000* AT MOST 1 0.002173 60.60482 0.00000* AT MOST 1 0.002173 7.246049 0.00000* AT MOST 1 0.002173 60.60482 0.00000* AT MOST 1 0.002173 7.246049 0.00000* AT MOST 1 0.002173 60.60482 0.00000* AT MOST 1 0.002174 60.002174 60.002174 60.002174 60.002174 60.002174 60.002174 60.002174 60.002174 60.002174 60.002174 60.002174 60.002174 60. | CIPLA        |           |              |                |         |
| AT MOST 2  |              |           |              |                |         |
| AT MOST 1  |              | AT MOST 2 |              |                | 0.0891  |
| HCLTECH  | GAIL         | NONE      | 0.110843     | 363.6489       | 0.0001* |
| HILDITULY   NONE   |              | AT MOST 1 | 0.016165     | 50.67891       | 0.0000* |
| AT MOST 1  |              | AT MOST 2 | 0.002723     | 7.264793       | 0.0070* |
| HDFC   | HCLTECH      | NONE      | 0.080714     | 295.0346       | 0.0001* |
| HDFC   |              | AT MOST 1 | 0.025150     | 70.83714       | 0.0000* |
| AT MOST 1  |              |           |              |                |         |
| AT MOST 2  | HDFC         |           |              |                |         |
| HDFCBANK   |              |           |              |                |         |
| AT MOST 1  | UDECDAN      |           |              |                |         |
| AT MOST 2  | HDFCBANK     |           |              |                |         |
| HEROMOTOCO   |              |           |              |                |         |
| AT MOST 1  | HEROMOTOCO   |           |              |                |         |
| HINDALCO   NONE  | TIEROWIOTOCO |           |              |                |         |
| HINDALCO   |              |           |              |                |         |
| AT MOST 1  | HINDALCO     |           |              |                |         |
| AT MOST 2  | 11111571200  |           |              |                |         |
| HINDULVR   |              |           |              |                |         |
| AT MOST 1  | HINDULVR     |           |              |                |         |
| ICICIBANK  |              | AT MOST 1 |              |                |         |
| AT MOST 1  |              | AT MOST 2 | 5.77E-08     | 0.000154       | 0.9917  |
| AT MOST 2  | ICICIBANK    | NONE      | 0.025149     | 103.9706       | 0.0000* |
| INFOSYS  |              | AT MOST 1 | 0.010718     | 36.11634       | 0.0000* |
| AT MOST 1  |              | AT MOST 2 | 0.002778     | 7.410052       | 0.0065* |
| AT MOST 2  | INFOSYS      |           |              |                |         |
| ITC  |              |           |              |                |         |
| AT MOST 1  |              |           |              |                |         |
| AT MOST 2  | ITC          |           |              |                |         |
| M&M  |              |           |              |                |         |
| AT MOST 1  | N40 N4       |           |              |                |         |
| AT MOST 2  | IVI&IVI      |           |              |                |         |
| NONE   |              |           |              |                |         |
| AT MOST 1  | MARUTI       |           |              |                |         |
| AT MOST 2  |              |           |              |                |         |
| ONGC         NONE         0.073979         237.8241         0.0001*           AT MOST 1         0.011445         33.07228         0.0001*           AT MOST 2         0.000903         2.406589         0.1208           RELIANCE         NONE         0.031077         145.2358         0.0001*           AT MOST 1         0.021298         61.13175         0.0000*           AT MOST 2         0.001419         3.781998         0.0518           SBIN         NONE         0.055732         185.5875         0.0001*           AT MOST 1         0.010814         32.81904         0.0001*           AT MOST 2         0.001445         3.852466         0.0497*           TATAMOTORS         NONE         0.079052         256.2489         0.0001*           AT MOST 1         0.012623         36.86329         0.0000*           AT MOST 2         0.001133         3.021238         0.0822           TATAPOWER         NONE         0.042181         146.2759         0.0001*           AT MOST 1         0.011220         31.46558         0.0001*           AT MOST 2         0.000528         1.405941         0.2357           TATASTEEL         NONE         0.057867         273.184   |              |           |              |                |         |
| AT MOST 1  | ONGC         |           |              |                |         |
| AT MOST 2  |              |           |              |                |         |
| AT MOST 1 0.021298 61.13175 0.0000* AT MOST 2 0.001419 3.781998 0.0518  SBIN NONE 0.055732 185.5875 0.0001* AT MOST 1 0.010814 32.81904 0.0001* AT MOST 2 0.001445 3.852466 0.0497*  TATAMOTORS NONE 0.079052 256.2489 0.0001* AT MOST 1 0.012623 36.86329 0.0000* AT MOST 2 0.001133 3.021238 0.0822  TATAPOWER NONE 0.042181 146.2759 0.0001* AT MOST 1 0.011220 31.46558 0.0001* AT MOST 2 0.000528 1.405941 0.2357  TATASTEEL NONE 0.057867 273.1844 0.0001* AT MOST 1 0.040346 114.3876 0.0001* AT MOST 2 0.00154 4.677142 0.0306* TCS NONE 0.100684 365.0457 0.0001* AT MOST 1 0.030291 82.33842 0.0000* AT MOST 2 0.000148 0.394928 0.5297  NIFTY50 NONE 0.078680 270.9873 0.0001* AT MOST 1 0.018962 52.67701 0.0000*  | L            |           | 0.000903     |                |         |
| AT MOST 2  | RELIANCE     | NONE      | 0.031077     | 145.2358       | 0.0001* |
| SBIN         NONE         0.055732         185.5875         0.0001*           AT MOST 1         0.010814         32.81904         0.0001*           AT MOST 2         0.001445         3.852466         0.0497*           TATAMOTORS         NONE         0.079052         256.2489         0.0001*           AT MOST 1         0.012623         36.86329         0.0000*           AT MOST 2         0.001133         3.021238         0.0822           TATAPOWER         NONE         0.042181         146.2759         0.0001*           AT MOST 1         0.011220         31.46558         0.0001*           AT MOST 2         0.000528         1.405941         0.2357           TATASTEEL         NONE         0.057867         273.1844         0.0001*           AT MOST 1         0.040346         114.3876         0.0001*           AT MOST 2         0.001754         4.677142         0.0306*           TCS         NONE         0.100684         365.0457         0.0001*           AT MOST 1         0.030291         82.33842         0.0000*           AT MOST 2         0.000148         0.394928         0.5297           NIFTY50         NONE         0.078680         270.9873   |              | AT MOST 1 | 0.021298     | 61.13175       | 0.0000* |
| AT MOST 1  |              | AT MOST 2 | 0.001419     |                |         |
| AT MOST 2 0.001445 3.852466 0.0497*  TATAMOTORS NONE 0.079052 256.2489 0.0001*  AT MOST 1 0.012623 36.86329 0.0000*  AT MOST 2 0.001133 3.021238 0.8822  TATAPOWER NONE 0.042181 146.2759 0.0001*  AT MOST 1 0.011220 31.46558 0.0001*  AT MOST 2 0.000528 1.405941 0.2357  TATASTEEL NONE 0.057867 273.1844 0.0001*  AT MOST 1 0.040346 114.3876 0.0001*  AT MOST 2 0.001754 4.677142 0.0306*  TCS NONE 0.100684 365.0457 0.0001*  AT MOST 1 0.030291 82.33842 0.0000*  AT MOST 2 0.000148 0.394928 0.5297  NIFTY50 NONE 0.078680 270.9873 0.0001*  AT MOST 1 0.018962 52.67701 0.0000*   | SBIN         |           |              |                |         |
| TATAMOTORS   |              |           |              |                |         |
| AT MOST 1 0.012623 36.86329 0.0000*  AT MOST 2 0.001133 3.021238 0.0822  TATAPOWER NONE 0.042181 146.2759 0.0001*  AT MOST 1 0.011220 31.46558 0.0001*  AT MOST 2 0.000528 1.405941 0.2357  TATASTEEL NONE 0.057867 273.1844 0.0001*  AT MOST 1 0.040346 114.3876 0.0001*  AT MOST 2 0.001754 4.677142 0.0306*  TCS NONE 0.100684 365.0457 0.0001*  AT MOST 1 0.030291 82.33842 0.0000*  AT MOST 2 0.000148 0.394928 0.5297  NIFTY50 NONE 0.078680 270.9873 0.0001*  AT MOST 1 0.018962 52.67701 0.0000*   | TATA::0====  |           |              |                |         |
| AT MOST 2  | TATAMOTORS   |           |              |                |         |
| TATAPOWER         NONE         0.042181         146.2759         0.0001*           AT MOST 1         0.011220         31.46558         0.0001*           AT MOST 2         0.000528         1.405941         0.2357           TATASTEEL         NONE         0.057867         273.1844         0.0001*           AT MOST 1         0.040346         114.3876         0.0001*           AT MOST 2         0.001754         4.677142         0.0306*           NONE         0.100684         365.0457         0.0001*           AT MOST 1         0.030291         82.33842         0.0000*           AT MOST 2         0.000148         0.394928         0.5297           NIFTY50         NONE         0.078680         270.9873         0.0001*           AT MOST 1         0.018962         52.67701         0.0000*  |              |           |              |                |         |
| AT MOST 1 0.011220 31.46558 0.0001*  AT MOST 2 0.000528 1.405941 0.2357  TATASTEEL NONE 0.057867 273.1844 0.0001*  AT MOST 1 0.040346 114.3876 0.0001*  AT MOST 2 0.001754 4.677142 0.0306*  TCS NONE 0.100684 365.0457 0.0001*  AT MOST 1 0.030291 82.33842 0.0000*  AT MOST 2 0.000148 0.394928 0.5297  NIFTY50 NONE 0.078680 270.9873 0.0001*  AT MOST 1 0.018962 52.67701 0.0000*  | TATADOMED    |           |              |                |         |
| AT MOST 2 0.000528 1.405941 0.2357  TATASTEEL NONE 0.057867 273.1844 0.0001*  AT MOST 1 0.040346 114.3876 0.0001*  AT MOST 2 0.001754 4.677142 0.0306*  TCS NONE 0.100684 365.0457 0.0001*  AT MOST 1 0.030291 82.33842 0.0000*  AT MOST 2 0.000148 0.394928 0.5297  NIFTY50 NONE 0.078680 270.9873 0.0001*  AT MOST 1 0.018962 52.67701 0.0000*   | IAIAFOWER    |           |              |                |         |
| TATASTEEL NONE 0.057867 273.1844 0.0001*  AT MOST 1 0.040346 114.3876 0.0001*  AT MOST 2 0.001754 4.677142 0.0306*  TCS NONE 0.100684 365.0457 0.0001*  AT MOST 1 0.030291 82.33842 0.0000*  AT MOST 2 0.000148 0.394928 0.5297  NIFTY50 NONE 0.078680 270.9873 0.0001*  AT MOST 1 0.018962 52.67701 0.0000*   |              |           |              |                |         |
| AT MOST 1 0.040346 114.3876 0.0001*  AT MOST 2 0.001754 4.677142 0.0306*  TCS NONE 0.100684 365.0457 0.0001*  AT MOST 1 0.030291 82.33842 0.0000*  AT MOST 2 0.000148 0.394928 0.5297  NIFTY50 NONE 0.078680 270.9873 0.0001*  AT MOST 1 0.018962 52.67701 0.0000*   | TATASTEFI    |           |              |                |         |
| AT MOST 2 0.001754 4.677142 0.0306*  TCS NONE 0.100684 365.0457 0.0001*  AT MOST 1 0.030291 82.33842 0.0000*  AT MOST 2 0.000148 0.394928 0.5297  NIFTY50 NONE 0.078680 270.9873 0.0001*  AT MOST 1 0.018962 52.67701 0.0000*  |              |           |              |                |         |
| TCS  |              |           |              |                |         |
| AT MOST 1 0.030291 82.33842 0.0000* AT MOST 2 0.000148 0.394928 0.5297  NIFTY50 NONE 0.078680 270.9873 0.0001* AT MOST 1 0.018962 52.67701 0.0000*   | TCS          |           |              |                |         |
| AT MOST 2 0.000148 0.394928 0.5297  NIFTY50 NONE 0.078680 270.9873 0.0001*  AT MOST 1 0.018962 52.67701 0.0000*  |              |           |              |                |         |
| NIFTY50 NONE 0.078680 270.9873 0.0001*<br>AT MOST 1 0.018962 52.67701 0.0000*  |              |           |              |                |         |
|  | NIFTY50      |           |              |                |         |
| AT MOST 2 0.000630 1.678458 0.1951   |              | AT MOST 1 | 0.018962     | 52.67701       | 0.0000* |
|  |              | AT MOST 2 | 0.000630     | 1.678458       | 0.1951  |

Source: Computed Value. Note: \* denotes rejection of hypothesis at 5% level of significance

Johansen Co-integration test is used to examine the long run relationship. It is well known that Johansen Co-integration is very sensitive to the choice of lag length. So first a VAR model is fitted to the time series data in order to find an appropriate lag structure. The AIC, SC, LR are used to select the number of lags required in co-integration test. The co-integration test indicates there exist two co-integrating vector at the 5% level of significance. This indicates that the future close price, trading volume & open interest are co-integrated in long run. The trace test indicates the existence of two co-integrating equation at 5 % level of significance. Maximum Eigen Value test makes the confirmation of this result. Thus the 3 variables of the study have a long run equilibrium relationship between them. But in short run there may be deviations from this equilibrium & we have to verify whether such equilibrium converges to long run equilibrium or not. Thus VECM can be used to generate the short run dynamics.

| STOCKS   |   |   | <b>TABLE 8: VECTOR E</b>   | RROR CORRECTION   | ON RESULTS  |   |   |  |
|--|---|---|--|---|---|---|---|--|
|  | C(1): LNF CL (-1)   | C(2): D LNF CL (-1)   | C(3): D LN F CL (-2)   | C(4): D LNTV (-1)   | C(5): D LNTV (-2)   | C(6): D LNOI (-1)   | C(7): D LNOI (-2)   | C(8): C  |
| ACC  | 0.002658  | -0.62906  | -0.3218  | 0.006118  | 0.002735  | -0.00155  | 0.000571  | 6.07E-06   |
|  | 3.440242  | -33.9726  | -17.3793   | 3.490901  | 2.754907  | -1.45337  | 0.538897  | 0.012762   |
|  | 0.0006*   | 0*  | 0*   | 0.0005*   | 0.0059*   | 0.1462  | 0.59  | 0.9898   |
| AMBUJACEM  | -0.00044  | -0.69247  | -0.34314   | 0.004604  | 0.001846  | -0.001  | -0.00068  | 5.92E-06   |
|  | -1.27605  | -37.7906  | -18.7285   | 1.290793  | 0.904584  | -0.44547  | -0.30468  | 0.005794   |
|  | 0.2021  | 0*  | 0*   | 0.1969  | 0.3658  | 0.656   | 0.7606  | 0.9954   |
| BANKBARODA   | 0.004484  | -0.65598  | -0.33077   | 0.004457  | -0.00037  | -0.0004   | 0.000248  | 2.36E-05   |
|  | 2.04573   | -35.512   | -18.0025   | 1.396495  | -0.20397  | -0.20092  | 0.139012  | 0.025799   |
|  | 0.0409*   | 0*  | 0*   | 0.1627  | 0.8384  | 0.8408  | 0.8895  | 0.9794   |
| BHEL   | 7.18E-05  | -0.62972  | -0.31946   | 0.00182   | 0.000421  | -0.00375  | -0.0004   | -4.53E-06  |
|  | 0.318537  | -34.1693  | -17.3511   | 0.530931  | 0.206798  | -1.58102  | -0.18832  | -0.00474   |
|  | 0.7501  | 0*  | 0*   | 0.5955  | 0.8362  | 0.114   | 0.8506  | 0.9962   |
| BPCL   | 0.014252  | -0.67264  | -0.32215   | 0.007435  | 0.004279  | 0.000728  | 0.000542  | -1.45E-06  |
|  | 2.811966  | -35.5764  | -17.2147   | 3.463649  | 3.49451   | 0.506506  | 0.377275  | -0.00238   |
|  | 0.005*  | 0*  | 0*   | 0.0005*   | 0.0005*   | 0.6125  | 0.706   | 0.9981   |
| CIPLA  | -0.0035   | -0.63762  | -0.33415   | -0.00068  | -0.00156  | -0.00123  | -0.00203  | 1.02E-07   |
|  | -0.89417  | -34.387   | -18.1661   | -0.33325  | -1.28355  | -0.92893  | -1.55264  | 0.000172   |
|  | 0.3713  | 0*  | 0*   | 0.739   | 0.1994  | 0.353   | 0.1206  | 0.9999   |
| GAIL   | -0.00134  | -0.69064  | -0.36236   | 0.000343  | 0.000935  | -0.00123  | -0.00039  | 1.73E-05   |
|  | -0.38855  | -37.8432  | -19.9158   | 0.18025   | 0.851148  | -0.79463  | -0.25819  | 0.032352   |
|  | 0.6976  | 0*  | 0*   | 0.857   | 0.3948  | 0.4269  | 0.7963  | 0.9742   |
| HCLTECH  | 0.002115  | -0.63669  | -0.31494   | 0.005013  | 0.00256   | -0.00094  | 0.00019   | -9.45E-07  |
|  | 2.057605  | -34.4533  | -17.0485   | 2.009456  | 1.78903   | -0.49874  | 0.10134   | -0.0013  |
|  | 0.0397*   | 0*  | 0*   | 0.0446*   | 0.0737  | 0.618   | 0.9193  | 0.999  |
| HDFC   | -0.00273  | -0.65138  | -0.33231   | 0.003294  | 0.001549  | -0.00171  | -0.00082  | 8.96E-06   |
|  | -1.19883  | -35.4113  | -18.1162   | 0.941303  | 0.784692  | -0.70994  | -0.35654  | 0.010301   |
|  | 0.2307  | 0*  | 0*   | 0.3466  | 0.4327  | 0.4778  | 0.7215  | 0.9918   |
| HDFCBANK   | -0.00259  | -0.65408  | -0.33508   | 0.004961  | 0.00266   | -0.00041  | -0.001  | 7.83E-06   |
|  | -0.85683  | -35.4942  | -18.2606   | 1.436606  | 1.356414  | -0.16362  | -0.46447  | 0.0094   |
|  | 0.3916  | 0*  | 0*   | 0.1509  | 0.1751  | 0.87  | 0.6423  | 0.9925   |
| HEROMOTOCO   | -0.00575  | -0.60711  | -0.31487   | -0.00376  | -0.00233  | -0.00134  | -0.0005   | -1.58E-06  |
|  | -2.3204   | -32.8494  | -17.0753   | -2.58025  | -2.75772  | -1.14204  | -0.45455  | -0.00357   |
|  | 0.0204*   | 0*  | 0*   | 0.0099*   | 0.0059*   | 0.2535  | 0.6495  | 0.9972   |
| HINDALCO   | -4.18E-06   | -0.66018  | -0.32067   | 0.002581  | 0.0016  | -0.00127  | -0.00904  | -6.45E-07  |
|  | -0.00172  | -35.9405  | -17.5135   | 0.556841  | 0.60102   | -0.58653  | -4.16754  | -0.00054   |
|  | 0.9986  | 0*  | 0*   | 0.5777  | 0.5479  | 0.5576  | 0*  | 0.9996   |
| HINDULVR   | -0.00055  | -0.67036  | -0.32897   | 0.0101103   | 0.000755  | -1.18E-05   | 0.001049  | 9.05E-06   |
|  | -0.14986  | -36.1912  | -17.8232   | 0.794556  | 0.934784  | -0.01029  | 1.033595  | 0.022016   |
|  | 0.8809  | 0*  | 0*   | 0.4269  | 0.35  | 0.9918  | 0.3014  | 0.9824   |
| ICICIBANK  | 0.00012   | -0.63226  | -0.32252   | 0.000741  | -0.00193  | -0.00136  | -0.00029  | -2.69E-06  |
|  | 0.173932  | -34.382   | -17.5596   | 0.185081  | -0.85489  | -0.57997  | -0.12282  | -0.00292   |
|  | 0.8619  | 0*  | 0*   | 0.8532  | 0.3927  | 0.562   | 0.9023  | 0.9977   |
| INFOSYS  | -0.01253  | -0.65364  | -0.31809   | 0.010924  | 0.005264  | -0.00482  | -0.00566  | 2.85E-06   |
|  | -4.8493   | -35.6049  | -17.3737   | 4.397443  | 3.544409  | -2.62085  | -3.14749  | 0.004156   |
|  | 0*  | 0*  | 0*   | 0*  | 0.0004*   | 0.0088*   | 0.0017*   | 0.9967   |
| ITC  | -0.01178  | 0.0000  | -0.32945   | 0.04.450  |   |   |   |  |
|  |   | -0.64854  | -0.32343   | 0.01458   | 0.003729  | 0.000301  | -0.0065   | -1.60E-06  |
|  | -3.25495  | -0.64854<br>-34.9913  | -17.8353   | 3.061387  | 0.003729<br>1.365329  | 0.000301<br>0.079093  |   | -1.60E-06<br>-0.00127  |
|  |   |   |  |   |   |   | -0.0065   |  |
| M&M  | -3.25495  | -34.9913  | -17.8353   | 3.061387  | 1.365329  | 0.079093  | -0.0065<br>-1.83586   | -0.00127   |
| M&M  | -3.25495<br>0.0011*   | -34.9913<br>0*  | -17.8353<br>0*   | 3.061387<br>0.0022*   | 1.365329<br>0.1723  | 0.079093<br>0.937   | -0.0065<br>-1.83586<br>0.0665   | -0.00127<br>0.999  |
| M&M  | -3.25495<br>0.0011*<br>0.002459   | -34.9913<br>0*<br>-0.62246  | -17.8353<br>0*<br>-0.29082<br>-15.6483<br>0*   | 3.061387<br>0.0022*<br>0.006472   | 1.365329<br>0.1723<br>0.002075  | 0.079093<br>0.937<br>-0.00267   | -0.0065<br>-1.83586<br>0.0665<br>-0.00233   | -0.00127<br>0.999<br>1.32E-05  |
| M&M<br>MARUTI  | -3.25495<br>0.0011*<br>0.002459<br>2.224465   | -34.9913<br>0*<br>-0.62246<br>-33.4385  | -17.8353<br>0*<br>-0.29082<br>-15.6483   | 3.061387<br>0.0022*<br>0.006472<br>2.502801   | 1.365329<br>0.1723<br>0.002075<br>1.401838  | 0.079093<br>0.937<br>-0.00267<br>-1.67957   | -0.0065<br>-1.83586<br>0.0665<br>-0.00233<br>-1.46504   | -0.00127<br>0.999<br>1.32E-05<br>0.019397  |
|  | -3.25495<br>0.0011*<br>0.002459<br>2.224465<br>0.0262*  | -34.9913<br>0*<br>-0.62246<br>-33.4385<br>0*  | -17.8353<br>0*<br>-0.29082<br>-15.6483<br>0*   | 3.061387<br>0.0022*<br>0.006472<br>2.502801<br>0.0124*  | 1.365329<br>0.1723<br>0.002075<br>1.401838<br>0.1611  | 0.079093<br>0.937<br>-0.00267<br>-1.67957<br>0.0932   | -0.0065<br>-1.83586<br>0.0665<br>-0.00233<br>-1.46504<br>0.143  | -0.00127<br>0.999<br>1.32E-05<br>0.019397<br>0.9845  |
|  | -3.25495<br>0.0011*<br>0.002459<br>2.224465<br>0.0262*<br>0.00269   | -34.9913<br>0*<br>-0.62246<br>-33.4385<br>0*<br>-0.62579  | -17.8353<br>0*<br>-0.29082<br>-15.6483<br>0*<br>-0.29418   | 3.061387<br>0.0022*<br>0.006472<br>2.502801<br>0.0124*<br>0.002818  | 1.365329<br>0.1723<br>0.002075<br>1.401838<br>0.1611<br>0.000674  | 0.079093<br>0.937<br>-0.00267<br>-1.67957<br>0.0932<br>0.001009   | -0.0065<br>-1.83586<br>0.0665<br>-0.00233<br>-1.46504<br>0.143<br>0.000614  | -0.00127<br>0.999<br>1.32E-05<br>0.019397<br>0.9845<br>2.23E-05  |
|  | -3.25495<br>0.0011*<br>0.002459<br>2.224465<br>0.0262*<br>0.00269<br>1.280695   | -34.9913<br>0*<br>-0.62246<br>-33.4385<br>0*<br>-0.62579<br>-33.386   | -17.8353<br>0*<br>-0.29082<br>-15.6483<br>0*<br>-0.29418<br>-15.7149   | 3.061387<br>0.0022*<br>0.006472<br>2.502801<br>0.0124*<br>0.002818<br>1.582966<br>0.1135<br>0.003263  | 1.365329<br>0.1723<br>0.002075<br>1.401838<br>0.1611<br>0.000674<br>0.652351  | 0.079093<br>0.937<br>-0.00267<br>-1.67957<br>0.0932<br>0.001009<br>0.949262   | -0.0065<br>-1.83586<br>0.0665<br>-0.00233<br>-1.46504<br>0.143<br>0.000614<br>0.617015<br>0.5373<br>-0.00196  | -0.00127<br>0.999<br>1.32E-05<br>0.019397<br>0.9845<br>2.23E-05<br>0.046539<br>0.9629  |
| MARUTI   | -3.25495<br>0.0011*<br>0.002459<br>2.224465<br>0.00269*<br>1.280695<br>0.2004   | -34.9913<br>0*<br>-0.62246<br>-33.4385<br>0*<br>-0.62579<br>-33.386<br>0*   | -17.8353<br>0*<br>-0.29082<br>-15.6483<br>0*<br>-0.29418<br>-15.7149<br>0*   | 3.061387<br>0.0022*<br>0.006472<br>2.502801<br>0.0124*<br>0.002818<br>1.582966<br>0.1135  | 1.365329<br>0.1723<br>0.002075<br>1.401838<br>0.1611<br>0.000674<br>0.652351<br>0.5142  | 0.079093<br>0.937<br>-0.00267<br>-1.67957<br>0.0932<br>0.001009<br>0.949262<br>0.3426   | -0.0065<br>-1.83586<br>0.0665<br>-0.00233<br>-1.46504<br>0.143<br>0.000614<br>0.617015<br>0.5373  | -0.00127<br>0.999<br>1.32E-05<br>0.019397<br>0.9845<br>2.23E-05<br>0.046539<br>0.9629  |
| MARUTI   | -3.25495<br>0.0011*<br>0.002459<br>2.224465<br>0.0262*<br>0.00269<br>1.280695<br>0.2004<br>0.000575   | -34.9913<br>0*<br>-0.62246<br>-33.4385<br>0*<br>-0.62579<br>-33.386<br>0*<br>-0.65264   | -17.8353<br>0*<br>-0.29082<br>-15.6483<br>0*<br>-0.29418<br>-15.7149<br>0*<br>-0.31693   | 3.061387<br>0.0022*<br>0.006472<br>2.502801<br>0.0124*<br>0.002818<br>1.582966<br>0.1135<br>0.003263  | 1.365329<br>0.1723<br>0.002075<br>1.401838<br>0.1611<br>0.000674<br>0.652351<br>0.5142<br>-0.00089  | 0.079093<br>0.937<br>-0.00267<br>-1.67957<br>0.0932<br>0.001009<br>0.949262<br>0.3426<br>0.001007   | -0.0065<br>-1.83586<br>0.0665<br>-0.00233<br>-1.46504<br>0.143<br>0.000614<br>0.617015<br>0.5373<br>-0.00196  | -0.00127<br>0.999<br>1.32E-05<br>0.019397<br>0.9845<br>2.23E-05<br>0.046539<br>0.9629<br>-5.35E-06   |
| MARUTI   | -3.25495<br>0.0011*<br>0.002459<br>2.224465<br>0.0262*<br>0.00269<br>1.280695<br>0.2004<br>0.000575<br>0.608965   | -34.9913<br>0*<br>-0.62246<br>-33.4385<br>0*<br>-0.62579<br>-33.386<br>0*<br>-0.65264<br>-35.3002   | -17.8353<br>0*<br>-0.29082<br>-15.6483<br>0*<br>-0.29418<br>-15.7149<br>0*<br>-0.31693<br>-17.1865   | 3.061387<br>0.0022*<br>0.006472<br>2.502801<br>0.0124*<br>0.002818<br>1.582966<br>0.1135<br>0.003263<br>0.996747  | 1.365329<br>0.1723<br>0.002075<br>1.401838<br>0.1611<br>0.000674<br>0.652351<br>0.5142<br>-0.00089<br>-0.47699  | 0.079093<br>0.937<br>-0.00267<br>-1.67957<br>0.0932<br>0.001009<br>0.949262<br>0.3426<br>0.001007<br>0.417769   | -0.0065<br>-1.83586<br>0.0665<br>-0.00233<br>-1.46504<br>0.143<br>0.000614<br>0.617015<br>0.5373<br>-0.00196<br>-0.84684  | -0.00127<br>0.999<br>1.32E-05<br>0.019397<br>0.9845<br>2.23E-05<br>0.046539<br>0.9629<br>-5.35E-06<br>-0.00655   |
| MARUTI<br>ONGC   | -3.25495<br>0.0011*<br>0.002459<br>2.224465<br>0.0262*<br>0.00269<br>1.280695<br>0.2004<br>0.000575<br>0.608965<br>0.5426   | -34.9913<br>0*<br>-0.62246<br>-33.4385<br>0*<br>-0.62579<br>-33.386<br>0*<br>-0.65264<br>-35.3002<br>0*   | -17.8353<br>0*<br>-0.29082<br>-15.6483<br>0*<br>-0.29418<br>-15.7149<br>0*<br>-0.31693<br>-17.1865<br>0*   | 3.061387<br>0.0022*<br>0.006472<br>2.502801<br>0.0124*<br>0.002818<br>1.582966<br>0.1135<br>0.003263<br>0.996747<br>0.319   | 1.365329<br>0.1723<br>0.002075<br>1.401838<br>0.1611<br>0.000674<br>0.652351<br>0.5142<br>-0.00089<br>-0.47699<br>0.6334  | 0.079093<br>0.937<br>-0.00267<br>-1.67957<br>0.0932<br>0.001009<br>0.949262<br>0.3426<br>0.001007<br>0.417769<br>0.6761   | -0.0065<br>-1.83586<br>0.0665<br>-0.00233<br>-1.46504<br>0.143<br>0.000614<br>0.617015<br>0.5373<br>-0.00196<br>-0.84684<br>0.3972  | -0.00127<br>0.999<br>1.32E-05<br>0.019397<br>0.9845<br>2.23E-05<br>0.046539<br>0.9629<br>-5.35E-06<br>-0.00655<br>0.9948   |
| MARUTI<br>ONGC   | -3.25495<br>0.0011*<br>0.002459<br>2.224465<br>0.0262*<br>0.00269<br>1.280695<br>0.2004<br>0.000575<br>0.608965<br>0.5426<br>-0.00086   | -34.9913<br>0*<br>-0.62246<br>-33.4385<br>0*<br>-0.62579<br>-33.386<br>0*<br>-0.65264<br>-35.3002<br>0*<br>-0.62362   | -17.8353<br>0*<br>-0.29082<br>-15.6483<br>0*<br>-0.29418<br>-15.7149<br>0*<br>-0.31693<br>-17.1865<br>0*<br>-0.29176   | 3.061387<br>0.0022*<br>0.006472<br>2.502801<br>0.0124*<br>0.002818<br>1.582966<br>0.1135<br>0.003263<br>0.996747<br>0.319<br>-0.00159   | 1.365329<br>0.1723<br>0.002075<br>1.401838<br>0.1611<br>0.000674<br>0.652351<br>0.5142<br>-0.00089<br>-0.47699<br>0.6334<br>0.000135  | 0.079093<br>0.937<br>-0.00267<br>-1.67957<br>0.0932<br>0.001009<br>0.949262<br>0.3426<br>0.001007<br>0.417769<br>0.6761<br>-0.00094   | -0.0065<br>-1.83586<br>0.0665<br>-0.00233<br>-1.46504<br>0.143<br>0.000614<br>0.617015<br>0.5373<br>-0.00196<br>-0.84684<br>0.3972<br>0.00084   | -0.00127<br>0.999<br>1.32E-05<br>0.019397<br>0.9845<br>2.23E-05<br>0.046539<br>0.9629<br>-5.35E-06<br>-0.00655<br>0.9948<br>8.27E-06   |
| MARUTI<br>ONGC   | -3.25495<br>0.0011*<br>0.002459<br>2.224465<br>0.0269*<br>1.280695<br>0.2004<br>0.000575<br>0.608965<br>0.5426<br>-0.00086<br>-0.65772  | -34.9913<br>0*<br>-0.62246<br>-33.4385<br>0*<br>-0.62579<br>-33.386<br>0*<br>-0.65264<br>-35.3002<br>0*<br>-0.62362<br>-33.5782   | -17.8353<br>0*<br>-0.29082<br>-15.6483<br>0*<br>-0.29418<br>-15.7149<br>0*<br>-0.31693<br>-17.1865<br>0*<br>-0.29176<br>-15.7002   | 3.061387<br>0.0022*<br>0.006472<br>2.502801<br>0.0124*<br>0.002818<br>1.582966<br>0.1135<br>0.003263<br>0.996747<br>0.319<br>-0.00159<br>-0.57912   | 1.365329<br>0.1723<br>0.002075<br>1.401838<br>0.1611<br>0.000674<br>0.652351<br>0.5142<br>-0.00089<br>-0.47699<br>0.6334<br>0.000135<br>0.085915  | 0.079093<br>0.937<br>-0.00267<br>-1.67957<br>0.0932<br>0.001009<br>0.949262<br>0.3426<br>0.001007<br>0.417769<br>0.6761<br>-0.00094<br>-0.71409   | -0.0065<br>-1.83586<br>0.0665<br>-0.00233<br>-1.46504<br>0.143<br>0.000614<br>0.617015<br>0.5373<br>-0.00196<br>-0.84684<br>0.3972<br>0.00084<br>0.649733   | -0.00127<br>0.999<br>1.32E-05<br>0.019397<br>0.9845<br>2.23E-05<br>0.046539<br>0.9629<br>-5.35E-06<br>-0.00655<br>0.9948<br>8.27E-06   |
| MARUTI ONGC RELIANCE   | -3.25495<br>0.0011*<br>0.002459<br>2.224465<br>0.00269<br>1.280695<br>0.2004<br>0.000575<br>0.608965<br>0.5426<br>-0.65772<br>0.5108  | -34.9913<br>0*<br>-0.62246<br>-33.4385<br>0*<br>-0.62579<br>-33.386<br>0*<br>-0.65264<br>-35.3002<br>0*<br>-0.62362<br>-33.5782<br>0*   | -17.8353<br>0*<br>-0.29082<br>-15.6483<br>0*<br>-0.29418<br>-15.7149<br>0*<br>-0.31693<br>-17.1865<br>0*<br>-0.29176<br>-15.7002<br>0*   | 3.061387<br>0.0022*<br>0.006472<br>2.502801<br>0.0124*<br>0.002818<br>1.582966<br>0.1135<br>0.003263<br>0.996747<br>0.319<br>-0.00159<br>-0.57912<br>0.5626   | 1.365329<br>0.1723<br>0.002075<br>1.401838<br>0.1611<br>0.000674<br>0.652351<br>0.5142<br>-0.00089<br>-0.47699<br>0.6334<br>0.000135<br>0.085915<br>0.9315  | 0.079093<br>0.937<br>-0.00267<br>-1.67957<br>0.0932<br>0.001009<br>0.949262<br>0.3426<br>0.001007<br>0.417769<br>0.6761<br>-0.00094<br>-0.71409<br>0.4752   | -0.0065<br>-1.83586<br>0.0665<br>-0.00233<br>-1.46504<br>0.143<br>0.000614<br>0.617015<br>0.5373<br>-0.00196<br>-0.84684<br>0.3972<br>0.00084<br>0.649733<br>0.5159   | -0.00127<br>0.999<br>1.32E-05<br>0.019397<br>0.9845<br>2.23E-05<br>0.046539<br>0.9629<br>-5.35E-06<br>-0.00655<br>0.9948<br>8.27E-06<br>0.01369  |
| MARUTI ONGC RELIANCE   | -3.25495<br>0.0011*<br>0.002459<br>2.224465<br>0.0262*<br>0.00269<br>1.280695<br>0.2004<br>0.000575<br>0.608965<br>0.5426<br>-0.0086<br>-0.65772<br>0.5108<br>-0.00434  | -34.9913<br>0*<br>-0.62246<br>-33.4385<br>0*<br>-0.62579<br>-33.386<br>0*<br>-0.65264<br>-35.3002<br>0*<br>-0.62362<br>-33.5782<br>0*<br>-0.624904  | -17.8353<br>0*<br>-0.29082<br>-15.6483<br>0*<br>-0.29418<br>-15.7149<br>0*<br>-0.31693<br>-17.1865<br>0*<br>-0.29176<br>-15.7002<br>0*<br>-0.32302   | 3.061387<br>0.0022*<br>0.006472<br>2.502801<br>0.0124*<br>0.002818<br>1.582966<br>0.1135<br>0.003263<br>0.996747<br>0.319<br>-0.00159<br>-0.57912<br>0.5626<br>-0.00854   | 1.365329<br>0.1723<br>0.002075<br>1.401838<br>0.1611<br>0.000674<br>0.652351<br>0.5142<br>-0.00089<br>-0.47699<br>0.6334<br>0.000135<br>0.085915<br>0.9315<br>-0.00361  | 0.079093<br>0.937<br>-0.00267<br>-1.67957<br>0.0932<br>0.001009<br>0.949262<br>0.3426<br>0.001007<br>0.417769<br>0.6761<br>-0.00094<br>-0.71409<br>0.4752<br>-0.00091   | -0.0065<br>-1.83586<br>0.0665<br>-0.00233<br>-1.46504<br>0.143<br>0.000614<br>0.617015<br>0.5373<br>-0.00196<br>-0.84684<br>0.3972<br>0.00084<br>0.649733<br>0.5159<br>0.001518   | -0.00127<br>0.999<br>1.32E-05<br>0.019397<br>2.23E-05<br>0.046539<br>0.9629<br>-5.35E-06<br>-0.00655<br>0.9948<br>8.27E-06<br>0.01369<br>0.9891<br>9.41E-06  |
| MARUTI ONGC RELIANCE   | -3.25495<br>0.0011*<br>0.002459<br>2.224465<br>0.0262*<br>0.00269<br>1.280695<br>0.2004<br>0.000575<br>0.608965<br>0.5426<br>-0.0086<br>-0.65772<br>0.5108<br>-0.00434<br>-1.84307  | -34.9913<br>0*<br>-0.62246<br>-33.4385<br>0*<br>-0.62579<br>-33.386<br>0*<br>-0.65264<br>-35.3002<br>0*<br>-0.62362<br>-33.5782<br>0*<br>-0.64904<br>-35.247  | -17.8353<br>0*<br>-0.29082<br>-15.6483<br>0*<br>-0.29418<br>-15.7149<br>0*<br>-0.31693<br>-17.1865<br>0*<br>-0.29176<br>-15.7002<br>0*<br>-0.32302<br>-17.554  | 3.061387<br>0.0022*<br>0.006472<br>2.502801<br>0.0124*<br>0.002818<br>1.582966<br>0.1135<br>0.003263<br>0.996747<br>0.319<br>-0.00159<br>-0.5626<br>-0.00854<br>-1.71105  | 1.365329<br>0.1723<br>0.002075<br>1.401838<br>0.1611<br>0.000674<br>0.652351<br>0.5142<br>-0.00089<br>-0.47699<br>0.6334<br>0.000135<br>0.085915<br>0.9315<br>-0.00361<br>-1.2901   | 0.079093<br>0.937<br>-0.00267<br>-1.67957<br>0.0932<br>0.001009<br>0.949262<br>0.3426<br>0.001007<br>0.417769<br>0.6761<br>-0.00094<br>-0.71409<br>0.4752<br>-0.00091<br>-0.35875   | -0.0065 -1.83586 0.0665 -0.00233 -1.46504 0.143 0.000614 0.617015 0.5373 -0.00196 -0.84684 0.3972 0.00084 0.649733 0.5159 0.001518 0.592559   | -0.00127<br>0.999<br>1.32E-05<br>0.019397<br>0.9845<br>2.23E-05<br>0.046539<br>0.9629<br>-5.35E-06<br>-0.00655<br>0.9948<br>8.27E-06<br>0.01369<br>0.9891<br>9.41E-06<br>0.008322  |
| MARUTI ONGC RELIANCE SBIN  | -3.25495<br>0.0011*<br>0.002459<br>2.224465<br>0.0262*<br>0.00269<br>1.280695<br>0.2004<br>0.000575<br>0.608965<br>0.5426<br>-0.00086<br>-0.65772<br>0.5108<br>-0.00434<br>-1.84307<br>0.0654   | -34.9913<br>0*<br>-0.62246<br>-33.4385<br>0*<br>-0.62579<br>-33.386<br>0*<br>-0.65264<br>-35.3002<br>0*<br>-0.62362<br>-33.5782<br>0*<br>-0.64904<br>-35.247<br>0*  | -17.8353<br>0*<br>-0.29082<br>-15.6483<br>0*<br>-0.29418<br>-15.7149<br>0*<br>-0.31693<br>-17.1865<br>0*<br>-0.29176<br>-15.7002<br>0*<br>-0.32302<br>-17.554<br>0*                                    | 3.061387<br>0.0022*<br>0.006472<br>2.502801<br>0.0124*<br>0.002818<br>1.582966<br>0.1135<br>0.003263<br>0.996747<br>0.319<br>-0.00159<br>-0.57912<br>0.5626<br>-0.00854<br>-1.71105<br>0.0872   | 1.365329<br>0.1723<br>0.002075<br>1.401838<br>0.1611<br>0.000674<br>0.652351<br>0.5142<br>-0.00089<br>-0.47699<br>0.6334<br>0.000135<br>0.085915<br>0.9315<br>-0.00361<br>-1.2901<br>0.1971   | 0.079093<br>0.937<br>-0.00267<br>-1.67957<br>0.0932<br>0.001009<br>0.949262<br>0.3426<br>0.001007<br>0.417769<br>0.6761<br>-0.00094<br>-0.71409<br>0.4752<br>-0.00091<br>-0.35875<br>0.7198   | -0.0065 -1.83586 0.0665 -0.00233 -1.46504 0.143 0.000614 0.617015 0.5373 -0.00196 -0.84684 0.3972 0.00084 0.649733 0.5159 0.001518 0.592559 0.5535  | -0.00127<br>0.999<br>1.32E-05<br>0.019397<br>0.9845<br>2.23E-05<br>0.046539<br>-5.35E-06<br>-0.00655<br>0.9948<br>8.27E-06<br>0.01369<br>0.9891<br>9.41E-06<br>0.008322<br>0.9934  |
| MARUTI ONGC RELIANCE SBIN  | -3.25495<br>0.0011*<br>0.002459<br>2.224465<br>0.0269*<br>1.280695<br>0.2004<br>0.00575<br>0.608965<br>0.5426<br>-0.0086<br>-0.65772<br>0.5108<br>-0.00434<br>-1.84307<br>0.0654<br>0.002117  | -34.9913<br>0*<br>-0.62246<br>-33.4385<br>0*<br>-0.62579<br>-33.386<br>0*<br>-0.65264<br>-35.3002<br>0*<br>-0.62362<br>-33.5782<br>0*<br>-0.64904<br>-35.247<br>0*<br>-0.60248  | -17.8353 0* -0.29082 -15.6483 0* -0.29418 -15.7149 0* -0.31693 -17.1865 0* -0.29176 -15.7002 0* -0.32302 -17.554 0* -0.29974   | 3.061387<br>0.0022*<br>0.006472<br>2.502801<br>0.0124*<br>0.002818<br>1.582966<br>0.1135<br>0.003263<br>0.996747<br>0.319<br>-0.00159<br>-0.57912<br>0.5626<br>-0.00854<br>-1.71105<br>0.0872<br>0.010001   | 1.365329 0.1723 0.002075 1.401838 0.1611 0.000674 0.652351 0.5142 -0.00089 0.6334 0.000135 0.085915 0.9315 -0.00361 -1.2901 0.1971 0.004803   | 0.079093<br>0.937<br>-0.00267<br>-1.67957<br>0.0932<br>0.001009<br>0.949262<br>0.3426<br>0.001007<br>0.417769<br>0.6761<br>-0.00094<br>-0.71409<br>0.4752<br>-0.00091<br>-0.35875<br>0.7198<br>0.001472   | -0.0065 -1.83586 0.0665 -0.00233 -1.46504 0.143 0.000614 0.617015 0.5373 -0.00196 -0.84684 0.3972 0.00084 0.649733 0.5159 0.001518 0.592559 0.5535 0.000398   | -0.00127<br>0.999<br>1.32E-05<br>0.019397<br>0.9845<br>2.23E-05<br>0.046539<br>0.9629<br>-5.35E-06<br>0.00655<br>0.9948<br>8.27E-06<br>0.01369<br>0.9891<br>9.41E-06<br>0.008322<br>0.9934<br>1.71E-05   |
| MARUTI ONGC RELIANCE SBIN  | -3.25495 0.0011* 0.002459 2.224465 0.0262* 0.00269 1.280695 0.2004 0.000575 0.608965 0.5426 -0.00086 -0.65772 0.5108 -0.00434 -1.84307 0.06554 0.002117 1.831746  | -34.9913<br>0*<br>-0.62246<br>-33.4385<br>0*<br>-0.62579<br>-33.386<br>0*<br>-0.65264<br>-35.3002<br>0*<br>-0.62362<br>-33.5782<br>0*<br>-0.64904<br>-35.247<br>0*<br>-0.60248<br>-32.4752  | -17.8353 0* -0.29082 -15.6483 0* -0.29418 -15.7149 0* -0.31693 -17.1865 0* -0.29176 -15.7002 0* -0.32302 -17.554 0* -0.29974 -16.1814  | 3.061387<br>0.0022*<br>0.006472<br>2.502801<br>0.0124*<br>0.002818<br>1.582966<br>0.1135<br>0.093263<br>0.996747<br>0.319<br>-0.00159<br>-0.57912<br>0.5626<br>-0.00854<br>-1.71105<br>0.0872<br>0.010001<br>2.445949                             | 1.365329 0.1723 0.002075 1.401838 0.1611 0.000674 0.652351 0.5142 -0.00089 -0.47699 0.6334 0.000135 0.085915 0.9315 -0.00361 -1.2901 0.1971 0.004803 2.060553   | 0.079093<br>0.937<br>-0.00267<br>-1.67957<br>0.0932<br>0.001009<br>0.949262<br>0.3426<br>0.001007<br>0.417769<br>0.6761<br>-0.00094<br>-0.71409<br>0.4752<br>-0.00091<br>-0.35875<br>0.7198<br>0.001472<br>0.718645   | -0.0065 -1.83586 0.0665 -0.00233 -1.46504 0.143 0.000614 0.617015 0.5373 -0.00196 -0.84684 0.3972 0.00084 0.649733 0.5159 0.001518 0.59259 0.5535 0.000398 0.193345   | -0.00127<br>0.999<br>1.32E-05<br>0.019397<br>0.9845<br>2.23E-05<br>0.046539<br>0.9629<br>-5.35E-06<br>-0.00655<br>0.9948<br>8.27E-06<br>0.01369<br>0.9891<br>9.41E-06<br>0.098322<br>0.9934<br>1.71E-05<br>0.018017  |
| MARUTI ONGC  RELIANCE  SBIN  TATAMOTORS                            | -3.25495 0.0011* 0.002459 2.224465 0.00269 1.280695 0.2004 0.000575 0.608965 0.5426 -0.65772 0.5108 -0.00434 -1.84307 0.0654 0.002117 1.831746 0.0671   | -34.9913<br>0*<br>-0.62246<br>-33.4385<br>0*<br>-0.62579<br>-33.386<br>0*<br>-0.65264<br>-35.3002<br>0*<br>-0.62362<br>-33.5782<br>0*<br>-0.64904<br>-35.247<br>0*<br>-0.60248<br>-32.4752<br>0*  | -17.8353 0* -0.29082 -15.6483 0* -0.29418 -15.7149 0* -0.31693 -17.1865 0* -0.29176 -15.7002 0* -0.32302 -17.554 0* -0.29974 -16.1814 0*   | 3.061387<br>0.0022*<br>0.006472<br>2.502801<br>0.0124*<br>0.002818<br>1.582966<br>0.1135<br>0.003263<br>0.996747<br>0.319<br>-0.00159<br>-0.57912<br>0.5626<br>-0.00854<br>-1.71105<br>0.0872<br>0.010001<br>2.445949<br>0.0145*                  | 1.365329 0.1723 0.002075 1.401838 0.1611 0.000674 0.652351 0.5142 -0.00089 -0.47699 0.6334 0.000135 0.085915 0.9315 -0.00361 -1.2901 0.1971 0.004803 2.060553 0.0394*   | 0.079093<br>0.937<br>-0.00267<br>-1.67957<br>0.0932<br>0.001009<br>0.949262<br>0.3426<br>0.001007<br>0.417769<br>0.6761<br>-0.00094<br>-0.71409<br>0.4752<br>-0.00091<br>-0.35875<br>0.7198<br>0.001472<br>0.718645<br>0.4724                                   | -0.0065 -1.83586 0.0665 -0.00233 -1.46504 0.143 0.000614 0.617015 0.5373 -0.00196 -0.84684 0.3972 0.00084 0.649733 0.5159 0.001518 0.592559 0.55535 0.000398 0.193345 0.8467  | -0.00127<br>0.999<br>1.32E-05<br>0.019397<br>0.9845<br>2.23E-05<br>0.046539<br>0.9629<br>-5.35E-06<br>-0.00655<br>0.0948<br>8.27E-06<br>0.01369<br>0.9891<br>9.41E-06<br>0.008322<br>0.9934<br>1.71E-05<br>0.018017<br>0.9856  |
| MARUTI ONGC  RELIANCE  SBIN  TATAMOTORS                            | -3.25495 0.0011* 0.002459 2.224465 0.00262* 0.00269 1.280695 0.2004 0.000575 0.608965 0.5426 -0.00586 -0.65772 0.5108 -0.00434 -1.84307 0.0654 0.002117 1.831746 0.00757 0.000567   | -34.9913<br>0*<br>-0.62246<br>-33.4385<br>0*<br>-0.62579<br>-33.386<br>0*<br>-0.65264<br>-35.3002<br>0*<br>-0.62362<br>-33.5782<br>0*<br>-0.64904<br>-35.247<br>0*<br>-0.60248<br>-32.4752<br>0*<br>-0.67181  | -17.8353 0* -0.29082 -15.6483 0* -0.29418 -15.7149 0* -0.31693 -17.1865 0* -0.29176 -15.7002 0* -0.32302 -17.554 0* -0.29974 -16.1814 0* -0.32956  | 3.061387<br>0.0022*<br>0.006472<br>2.502801<br>0.0124*<br>0.002818<br>1.582966<br>0.1135<br>0.003263<br>0.996747<br>0.319<br>-0.00159<br>-0.57912<br>0.5626<br>-0.00854<br>-1.771105<br>0.0872<br>0.010001<br>2.445949<br>0.0145*<br>0.005176     | 1.365329 0.1723 0.002075 1.401838 0.1611 0.000674 0.652351 0.5142 -0.00089 -0.47699 0.6334 0.000135 0.085915 0.9315 -0.00361 -1.2901 0.1971 0.004803 2.060553 0.0394* 0.000482  | 0.079093<br>0.937<br>-0.00267<br>-1.67957<br>0.0932<br>0.001009<br>0.949262<br>0.3426<br>0.001007<br>0.417769<br>0.6761<br>-0.00094<br>-0.71409<br>0.4752<br>-0.00091<br>-0.35875<br>0.7198<br>0.001472<br>0.718645<br>0.4724<br>0.000487                       | -0.0065 -1.83586 0.0665 -0.00233 -1.46504 0.143 0.000614 0.617015 0.5373 -0.00196 -0.84684 0.3972 0.00084 0.649733 0.5159 0.001518 0.592559 0.5535 0.000398 0.193345 0.8467 -0.00167  | -0.00127<br>0.999<br>1.32E-05<br>0.019397<br>0.9845<br>2.23E-05<br>0.046539<br>0.9629<br>-5.35E-06<br>-0.00655<br>0.9948<br>8.27E-06<br>0.01369<br>0.9891<br>9.41E-06<br>0.008322<br>0.9934<br>1.71E-05<br>0.018017<br>0.9856<br>1.96E-05  |
| MARUTI ONGC  RELIANCE  SBIN  TATAMOTORS                            | -3.25495 0.0011* 0.002459 2.224465 0.00262* 0.00269 1.280695 0.2004 0.000575 0.608965 0.5426 -0.0086 -0.65772 0.5108 -0.00434 -1.84307 0.0654 0.002117 1.831746 0.807671 0.000567 1.063393  | -34.9913<br>0*<br>-0.62246<br>-33.4385<br>0*<br>-0.62579<br>-33.386<br>0*<br>-0.65264<br>-35.3002<br>0*<br>-0.62362<br>-33.5782<br>0*<br>-0.64904<br>-35.247<br>0*<br>-0.60248<br>-32.4752<br>0*<br>-0.60248<br>-32.4752<br>0*<br>-0.67181<br>-36.4686                                  | -17.8353 0* -0.29082 -15.6483 0* -0.29418 -15.7149 0* -0.31693 -17.1865 0* -0.29176 -15.7002 0* -0.32302 -17.554 0* -0.29974 -16.1814 0* -0.32956 -17.9123   | 3.061387<br>0.0022*<br>0.006472<br>2.502801<br>0.0124*<br>0.002818<br>1.582966<br>0.1135<br>0.003263<br>0.996747<br>0.319<br>-0.00159<br>-0.57912<br>0.5626<br>-0.00854<br>-1.71105<br>0.0872<br>0.010001<br>2.445949<br>0.005176<br>1.29886      | 1.365329 0.1723 0.002075 1.401838 0.1611 0.000674 0.652351 0.5142 -0.00089 -0.47699 0.6334 0.000135 0.085915 0.9315 -0.00361 -1.2901 0.1971 0.004803 2.060553 0.0394* 0.000482 0.20577  | 0.079093<br>0.937<br>-0.00267<br>-1.67957<br>0.0932<br>0.001009<br>0.949262<br>0.3426<br>0.001007<br>0.417769<br>0.6761<br>-0.00094<br>-0.71409<br>0.4752<br>-0.00991<br>-0.35875<br>0.7198<br>0.001472<br>0.718645<br>0.4724<br>0.000487<br>0.169155           | -0.0065 -1.83586 0.0665 -0.00233 -1.46504 0.143 0.000614 0.617015 0.5373 -0.00196 -0.84684 0.3972 0.00084 0.649733 0.5159 0.001518 0.592559 0.5535 0.000398 0.193345 0.8467 -0.00167  | -0.00127<br>0.999<br>1.32E-05<br>0.019397<br>2.23E-05<br>0.046539<br>0.9629<br>-5.35E-06<br>-0.00655<br>0.9948<br>8.27E-06<br>0.01369<br>0.9891<br>9.41E-06<br>0.008322<br>0.9934<br>1.71E-05<br>0.018017<br>0.9856<br>1.96E-05<br>0.01689   |
| MARUTI ONGC  RELIANCE SBIN TATAMOTORS TATAPOWER                    | -3.25495 0.0011* 0.002459 2.224465 0.00269 1.280695 0.2004 0.000575 0.608965 0.5426 -0.0086 -0.65772 0.5108 -0.00434 -1.84307 0.0654 0.002117 1.831746 0.0671 0.000567 1.063393 0.2877  | -34.9913<br>0*<br>-0.62246<br>-33.4385<br>0*<br>-0.62579<br>-33.386<br>0*<br>-0.65264<br>-35.3002<br>0*<br>-0.62362<br>-33.5782<br>0*<br>-0.64904<br>-35.247<br>0*<br>-0.60248<br>-32.4752<br>0*<br>-0.67181<br>-36.4686<br>0*  | -17.8353 0* -0.29082 -15.6483 0* -0.29418 -15.7149 0* -0.31693 -17.1865 0* -0.29176 -15.7002 0* -0.32302 -17.554 0* -0.29974 -16.1814 0* -0.32956 -17.9123 0*  | 3.061387 0.0022* 0.006472 2.502801 0.0124* 0.002818 1.582966 0.1135 0.003263 0.996747 0.319 -0.00159 -0.57912 0.5626 -0.00854 -1.71105 0.0872 0.010001 2.445949 0.0145* 0.005176 1.29886 0.1941   | 1.365329 0.1723 0.002075 1.401838 0.1611 0.000674 0.652351 0.5142 -0.00089 -0.47699 0.6334 0.000135 0.085915 0.9315 -0.00361 -1.2901 0.1971 0.004803 2.060553 0.0394* 0.000482 0.20577 0.837  | 0.079093<br>0.937<br>-0.00267<br>-1.67957<br>0.0932<br>0.001009<br>0.949262<br>0.3426<br>0.001007<br>0.417769<br>0.6761<br>-0.00094<br>-0.71409<br>0.4752<br>-0.00091<br>-0.35875<br>0.7198<br>0.001472<br>0.718645<br>0.4724<br>0.000487<br>0.169155<br>0.8657 | -0.0065 -1.83586 0.0665 -0.00233 -1.46504 0.143 0.000614 0.617015 0.5373 -0.00196 -0.84684 0.3972 0.00084 0.649733 0.5159 0.001518 0.592559 0.5535 0.000398 0.193345 0.8467 -0.00167 -0.59321 0.5531  | -0.00127<br>0.999<br>1.3ZE-05<br>0.019397<br>0.9845<br>2.23E-05<br>0.046539<br>0.9629<br>-5.35E-06<br>-0.00655<br>0.9948<br>8.27E-06<br>0.01369<br>0.9891<br>9.41E-06<br>0.008322<br>0.9934<br>1.71E-05<br>0.018017<br>0.9856<br>1.96E-05<br>0.01689<br>0.9865                                     |
| MARUTI ONGC  RELIANCE  SBIN  TATAMOTORS  TATAPOWER                 | -3.25495 0.0011* 0.002459 2.224465 0.0262* 0.00269 1.280695 0.2004 0.00575 0.608965 0.5426 -0.0086 -0.65772 0.5108 -0.00434 -1.84307 0.0654 0.002117 1.831746 0.0671 0.000567 1.063393 0.2877 0.002752  | -34.9913<br>0*<br>-0.62246<br>-33.4385<br>0*<br>-0.62579<br>-33.386<br>0*<br>-0.65264<br>-35.3002<br>0*<br>-0.62362<br>-33.5782<br>0*<br>-0.64904<br>-35.247<br>0*<br>-0.60248<br>-32.4752<br>0*<br>-0.67181<br>-36.4686<br>0*<br>-0.6507   | -17.8353 0* -0.29082 -15.6483 0* -0.29418 -15.7149 0* -0.31693 -17.1865 0* -0.29176 -15.7002 0* -0.32302 -17.554 0* -0.29974 -16.1814 0* -0.32956 -17.9123 0* -0.32088                                 | 3.061387 0.0022* 0.006472 2.502801 0.0124* 0.002818 1.582966 0.1135 0.003263 0.996747 0.319 -0.00159 -0.57912 0.5626 -0.00854 -1.71105 0.0872 0.010001 2.445949 0.0145* 0.005176 1.29886 0.1941 0.004721  | 1.365329 0.1723 0.002075 1.401838 0.1611 0.000674 0.652351 0.5142 -0.00089 -0.47699 0.6334 0.000135 0.085915 0.9315 -0.00361 -1.2901 0.1971 0.004803 2.060553 0.0394* 0.000482 0.20577 0.837 0.002259   | 0.079093 0.937 -0.00267 -1.67957 0.0932 0.001009 0.949262 0.3426 0.001007 0.417769 0.6761 -0.00094 -0.71409 0.4752 -0.00091 -0.35875 0.7198 0.001472 0.718645 0.4724 0.000487 0.169155 0.8657 -0.00235  | -0.0065 -1.83586 0.0665 -0.00233 -1.46504 0.143 0.000614 0.617015 0.5373 -0.00196 -0.84684 0.3972 0.00084 0.649733 0.5159 0.001518 0.59259 0.5535 0.000398 0.193345 0.8467 -0.00167 -0.59321 0.5531 -0.00136  | -0.00127<br>0.999<br>1.32E-05<br>0.019397<br>0.9845<br>2.23E-05<br>0.046539<br>0.9629<br>-5.35E-06<br>0.00655<br>0.9948<br>8.27E-06<br>0.01369<br>0.9881<br>9.41E-05<br>0.008322<br>0.9934<br>1.71E-05<br>0.018017<br>0.9856<br>1.96E-05<br>0.01689<br>0.9865<br>2.70E-05                          |
| MARUTI ONGC  RELIANCE  SBIN  TATAMOTORS  TATAPOWER                 | -3.25495 0.0011* 0.002459 2.224465 0.0262* 0.00269 1.280695 0.2004 0.000575 0.608965 0.5426 -0.065772 0.5108 -0.00434 -1.84307 0.0654 0.002117 1.831746 0.0671 0.000567 1.063393 0.2877 0.002752 1.184817   | -34.9913<br>0*<br>-0.62246<br>-33.4385<br>0*<br>-0.62579<br>-33.386<br>0*<br>-0.65264<br>-35.3002<br>0*<br>-0.62362<br>-33.5782<br>0*<br>-0.64904<br>-35.247<br>0*<br>-0.60248<br>-32.4752<br>0*<br>-0.67181<br>-36.4686<br>0*<br>-0.6507<br>-35.2087                                   | -17.8353 0* -0.29082 -15.6483 0* -0.29418 -15.7149 0* -0.31693 -17.1865 0* -0.29176 -15.7002 0* -0.32302 -17.554 0* -0.29974 -16.1814 0* -0.32956 -17.9123 0* -0.32088 -17.4196                        | 3.061387 0.0022* 0.006472 2.502801 0.0124* 0.002818 1.582966 0.1135 0.003263 0.996747 0.319 -0.00159 -0.57912 0.5626 -0.00854 -1.71105 0.0872 0.010001 2.445949 0.0145* 0.005176 1.29886 0.1941 0.004721 1.596251                                 | 1.365329 0.1723 0.002075 1.401838 0.1611 0.000674 0.652351 0.5142 -0.00089 -0.47699 0.6334 0.000135 0.085915 0.9315 -0.00361 -1.2901 0.1971 0.004803 2.060553 0.0394* 0.000482 0.20577 0.837 0.002259 1.352405                                  | 0.079093 0.937 -0.00267 -1.67957 0.0932 0.001009 0.949262 0.3426 0.001007 0.417769 0.6761 -0.00094 -0.71409 0.4752 -0.00091 -0.35875 0.7198 0.001472 0.718645 0.4724 0.000487 0.169155 0.8657 -0.00235 -1.85366   | -0.0065 -1.83586 0.0665 -0.00233 -1.46504 0.143 0.000614 0.617015 0.5373 -0.00196 -0.84684 0.3972 0.00084 0.649733 0.5159 0.001518 0.59259 0.5535 0.000398 0.193345 0.8467 -0.00167 -0.59321 0.5531 -0.00136 -1.06931                                 | -0.00127<br>0.999<br>1.32E-05<br>0.019397<br>0.9845<br>2.23E-05<br>0.046539<br>0.9629<br>-5.35E-06<br>-0.00655<br>0.9948<br>8.27E-06<br>0.01369<br>0.9891<br>9.41E-06<br>0.008322<br>0.9934<br>1.71E-05<br>0.018017<br>0.9856<br>1.96E-05<br>0.01689<br>0.9865<br>2.70E-05<br>0.041422             |
| MARUTI ONGC  RELIANCE  SBIN  TATAMOTORS  TATAPOWER  TATASTEEL      | -3.25495 0.0011* 0.002459 2.224465 0.00269 1.280695 0.2004 0.000575 0.608965 0.5426 -0.65772 0.5108 -0.0434 -1.84307 0.002117 1.831746 0.002117 1.831746 0.000567 1.063393 0.2877 0.002752 1.184817 0.2362  | -34.9913<br>0*<br>-0.62246<br>-33.4385<br>0*<br>-0.62579<br>-33.386<br>0*<br>-0.65264<br>-35.3002<br>0*<br>-0.62362<br>-33.5782<br>0*<br>-0.64904<br>-35.247<br>0*<br>-0.60248<br>-32.4752<br>0*<br>-0.67181<br>-36.4686<br>0*<br>-0.6507<br>-35.2087<br>0*                             | -17.8353 0* -0.29082 -15.6483 0* -0.29418 -15.7149 0* -0.31693 -17.1865 0* -0.29176 -15.7002 0* -0.32302 -17.554 0* -0.29974 -16.1814 0* -0.32956 -17.9123 0* -0.32088 -17.4196                        | 3.061387 0.0022* 0.006472 2.502801 0.0124* 0.002818 1.582966 0.1135 0.003263 0.996747 0.319 -0.00159 -0.57912 0.5626 -0.0854 -1.71105 0.0872 0.010001 2.445949 0.0145* 0.005176 1.29886 0.1941 0.004721 1.596251 0.1106                           | 1.365329 0.1723 0.002075 1.401838 0.1611 0.000674 0.652351 0.5142 -0.00089 -0.47699 0.6334 0.000135 0.085915 0.9315 -0.00361 -1.2901 0.1971 0.004803 2.060553 0.0394* 0.000482 0.20577 0.837 0.002259 1.352405 0.1764                           | 0.079093 0.937 -0.00267 -1.67957 0.0932 0.001009 0.949262 0.3426 0.001007 0.417769 0.6761 -0.00094 -0.71409 0.4752 -0.00591 -0.35875 0.7198 0.001472 0.718645 0.718645 0.4724 0.000487 0.169155 0.8657 -0.00235 -1.85366 0.0639                                 | -0.0065 -1.83586 0.0665 -0.00233 -1.46504 0.143 0.000614 0.617015 0.5373 -0.00196 -0.84684 0.3972 0.00084 0.649733 0.5159 0.001518 0.59259 0.5535 0.00398 0.193345 0.8467 -0.00167 -0.59321 0.5531 -0.00136 -1.06931 0.285                            | -0.00127<br>0.999<br>1.32E-05<br>0.019397<br>0.09845<br>2.23E-05<br>0.046539<br>0.9629<br>-5.35E-06<br>-0.00655<br>0.9948<br>8.27E-06<br>0.08322<br>0.0934<br>1.71E-05<br>0.018017<br>0.9856<br>1.96E-05<br>0.01689<br>0.270E-05<br>0.01689<br>0.270E-05<br>0.041422<br>0.967                      |
| MARUTI ONGC  RELIANCE  SBIN  TATAMOTORS  TATAPOWER  TATASTEEL      | -3.25495 0.0011* 0.002459 2.224465 0.00269 1.280695 0.2004 0.000575 0.608965 0.5426 -0.0086 -0.65772 0.5108 -0.00434 -1.84307 0.0654 0.002117 1.831746 0.002117 1.831746 0.00217 0.0075 0.0671 0.0075 0.06393 0.2877 0.00275 1.184817 0.2362 -3.20E-06 -0.03951 | -34.9913<br>0*<br>-0.62246<br>-33.4385<br>0*<br>-0.62579<br>-33.386<br>0*<br>-0.65264<br>-35.3002<br>0*<br>-0.62362<br>-33.5782<br>0*<br>-0.64904<br>-35.247<br>0*<br>-0.60248<br>-32.4752<br>0*<br>-0.67181<br>-36.4686<br>0*<br>-0.6507<br>-35.2087<br>0*                             | -17.8353 0* -0.29082 -15.6483 0* -0.29418 -15.7149 0* -0.31693 -17.1865 0* -0.29176 -15.7002 0* -0.32302 -17.554 0* -0.29974 -16.1814 0* -0.32956 -17.9123 0* -0.32088 -17.4196 0* -0.31846            | 3.061387 0.0022* 0.006472 2.502801 0.0124* 0.002818 1.582966 0.1135 0.003263 0.996747 0.319 -0.00159 -0.57912 0.5626 -0.00854 -1.71105 0.0872 0.010001 2.445949 0.0145* 0.095176 1.29886 0.1941 0.004721 1.596251 0.1106 0.001744 0.716598        | 1.365329 0.1723 0.002075 1.401838 0.1611 0.000674 0.652351 0.5142 -0.00089 -0.47699 0.6334 0.000135 0.085915 0.9315 -0.00361 -1.2901 0.1971 0.004803 2.060553 0.0394* 0.000259 1.352405 0.1764 -8.78E-05 -0.06184                               | 0.079093 0.937 -0.00267 -1.67957 0.0932 0.001009 0.949262 0.3426 0.001007 0.417769 0.6761 -0.00094 -0.71409 0.4752 -0.00091 -0.35875 0.7198 0.001472 0.718645 0.4724 0.000487 0.169155 0.8657 -0.00235 -1.85366 0.0639 -0.00117 -0.70322                        | -0.0065 -1.83586 0.0665 -0.00233 -1.46504 0.143 0.000614 0.617015 0.5373 -0.00196 -0.84684 0.3972 0.00084 0.649733 0.5159 0.001518 0.592559 0.5535 0.000398 0.193345 0.8467 -0.00167 -0.59321 0.5531 -0.00136 -1.06931 0.285 -0.00147 -0.87843        | -0.00127<br>0.999<br>1.32E-05<br>0.9845<br>2.23E-05<br>0.046539<br>0.9629<br>-5.35E-06<br>-0.00655<br>0.9948<br>8.27E-06<br>0.01369<br>0.9891<br>9.41E-06<br>0.008322<br>0.9934<br>1.71E-05<br>0.018017<br>0.96E-05<br>0.01689<br>0.9865<br>2.70E-05<br>0.041422<br>0.9967<br>1.96E-06<br>0.003043 |
| MARUTI ONGC  RELIANCE  SBIN  TATAMOTORS  TATAPOWER  TATASTEEL  TCS | -3.25495 0.0011* 0.002459 2.224465 0.00269 1.280695 0.2004 0.000575 0.5426 -0.0086 -0.65772 0.5108 -0.00434 -1.84307 0.002117 1.831746 0.002117 1.831746 0.000567 1.063393 0.2877 0.002752 1.184817 0.2362 -3.20E-06 -0.03951 0.9685                            | -34.9913<br>0*<br>-0.62246<br>-33.4385<br>0*<br>-0.62579<br>-33.386<br>0*<br>-0.65264<br>-35.3002<br>0*<br>-0.62362<br>-33.5782<br>0*<br>-0.64904<br>-35.247<br>0*<br>-0.60248<br>-32.4752<br>0*<br>-0.67181<br>-36.4686<br>0*<br>-0.6507<br>-35.2087<br>0*<br>-0.633<br>-34.3437<br>0* | -17.8353 0* -0.29082 -15.6483 0* -0.29418 -15.7149 0* -0.31693 -17.1865 0* -0.29176 -15.7002 0* -0.32302 -17.554 0* -0.29974 -16.1814 0* -0.32956 -17.9123 0* -0.32088 -17.4196 0* -0.31846 -17.287 0* | 3.061387 0.0022* 0.006472 2.502801 0.0124* 0.002818 1.582966 0.1135 0.003263 0.996747 0.319 -0.00159 -0.57912 0.5626 -0.00854 -1.71105 0.0872 0.010001 2.445949 0.0145* 0.005176 1.29886 0.1941 0.004721 1.596251 0.1106 0.001744 0.716598 0.4737 | 1.365329 0.1723 0.002075 1.401838 0.1611 0.000674 0.652351 0.5142 -0.00089 -0.47699 0.6334 0.000135 0.085915 0.9315 -0.00361 -1.2901 0.1971 0.004803 2.060553 0.0394* 0.000482 0.20577 0.837 0.002259 1.352405 0.1764 -8.78E-05 -0.06184 0.9507 | 0.079093 0.937 -0.00267 -1.67957 0.0932 0.001009 0.949262 0.3426 0.001007 0.417769 0.6761 -0.00094 -0.71409 0.4752 -0.00091 -0.35875 0.7188 0.001472 0.718645 0.4724 0.000487 0.169155 0.8657 -0.00235 -1.85366 0.0639 -0.00117 -0.70322 0.482                  | -0.0065 -1.83586 0.0665 -0.00233 -1.46504 0.143 0.000614 0.617015 0.5373 -0.00196 -0.84684 0.3972 0.00084 0.649733 0.5159 0.001518 0.592559 0.5535 0.000398 0.193345 0.8467 -0.00167 -0.59321 0.5531 -0.00136 -1.06931 0.285 -0.00147 -0.87843 0.3798 | -0.00127 0.999 1.32E-05 0.019397 0.9845 2.23E-05 0.046539 0.9629 -5.35E-06 0.01369 0.9891 9.41E-06 0.008322 0.9934 1.71E-05 0.018017 0.9856 1.96E-05 0.01689 0.9865 2.70E-05 0.041422 0.9976   |
| MARUTI ONGC  RELIANCE  SBIN  TATAMOTORS  TATAPOWER  TATASTEEL      | -3.25495 0.0011* 0.002459 2.224465 0.00269 1.280695 0.2004 0.000575 0.608965 0.5426 -0.0086 -0.65772 0.5108 -0.00434 -1.84307 0.0654 0.002117 1.831746 0.002117 1.831746 0.00217 0.0075 0.0671 0.0075 0.06393 0.2877 0.00275 1.184817 0.2362 -3.20E-06 -0.03951 | -34.9913<br>0*<br>-0.62246<br>-33.4385<br>0*<br>-0.62579<br>-33.386<br>0*<br>-0.65264<br>-35.3002<br>0*<br>-0.62362<br>-33.5782<br>0*<br>-0.64904<br>-35.247<br>0*<br>-0.60248<br>-32.4752<br>0*<br>-0.67181<br>-36.4686<br>0*<br>-0.6507<br>-35.2087<br>0*<br>-0.633<br>-34.3437       | -17.8353 0* -0.29082 -15.6483 0* -0.29418 -15.7149 0* -0.31693 -17.1865 0* -0.29176 -15.7002 0* -0.32302 -17.554 0* -0.29974 -16.1814 0* -0.32956 -17.9123 0* -0.32088 -17.4196 0* -0.31846 -17.287    | 3.061387 0.0022* 0.006472 2.502801 0.0124* 0.002818 1.582966 0.1135 0.003263 0.996747 0.319 -0.00159 -0.57912 0.5626 -0.00854 -1.71105 0.0872 0.010001 2.445949 0.0145* 0.095176 1.29886 0.1941 0.004721 1.596251 0.1106 0.001744 0.716598        | 1.365329 0.1723 0.002075 1.401838 0.1611 0.000674 0.652351 0.5142 -0.00089 -0.47699 0.6334 0.000135 0.085915 0.9315 -0.00361 -1.2901 0.1971 0.004803 2.060553 0.0394* 0.000259 1.352405 0.1764 -8.78E-05 -0.06184                               | 0.079093 0.937 -0.00267 -1.67957 0.0932 0.001009 0.949262 0.3426 0.001007 0.417769 0.6761 -0.00094 -0.71409 0.4752 -0.00091 -0.35875 0.7198 0.001472 0.718645 0.4724 0.000487 0.169155 0.8657 -0.00235 -1.85366 0.0639 -0.00117 -0.70322                        | -0.0065 -1.83586 0.0665 -0.00233 -1.46504 0.143 0.000614 0.617015 0.5373 -0.00196 -0.84684 0.3972 0.00084 0.649733 0.5159 0.001518 0.592559 0.5535 0.000398 0.193345 0.8467 -0.00167 -0.59321 0.5531 -0.00136 -1.06931 0.285 -0.00147 -0.87843        | -0.00127 0.999 1.32E-05 0.9845 2.23E-05 0.046539 0.9629 -5.35E-06 -0.00655 0.9948 8.27E-06 0.01369 0.9891 9.41E-06 0.008322 0.9934 1.71E-05 0.018017 0.9865 2.70E-05 0.01689 0.9865 2.70E-05 0.041422 0.9967 1.96E-06  |

Source: Computed Value.

It is observed that in the short run dynamics results from the error correction co-integrating term C(1) indicates the long run relationship and C(2) to C(7) indicates the short run relationship among the variables. It is being reflected that there exist a short run relationship among the variables for the majority of stocks for two co-integrating term that is C (2) [DLNFCL (-1)] & C (3) [DLNFCL (-2)]. In all these cases where the co-integrating term is negative and significant it is indicated that the errors are going back to the equilibrium and the error is getting corrected by 62% for C(2) and in range of 29% to 36% for C(3) co-integrating term for all the stocks. But in cases of stocks like ACC(0.002658), BANKBARODA(0.004484), BPCL(0.014252), HCLTECH(0.002115), MAHINDRA(0.002459) & NIFTY(0.014997) co-integrating term C(1) [LNFCL(-1)] indicating the long run relationship is positive and significant concluding that the error is getting exploded more and not impending back to equilibrium. Furthermore the co-integrating term C (1) [LNFCL (-1)] the error is being corrected in HERO (-0.005757), INFOSYS (-0.01253) & ITC (-0.01178). The co-integrating term C (4) [DLNTV (-1)] & C (5) [DLNTV (-2)] the error is bought to equilibrium in HERO & NIFTY. The co-integrating term C (6) [DLNOI (-1)] is bought to equilibrium only in INFOSYS (-0.00482) & C (7) [DLNOI (-2)] is being corrected in HINDALCO (-0.0094) & INFOSYS (-0.00566).

#### CONCLUSIONS

There are various reasons why traders pay attention to future price, trading volume and open interest. A rise in future closing price, trading volume and open interest indicates that the market is strong and in upward trend. While a fall in price and a rise in trading volume and open interest indicate that the market is weak and downward trend. This study concluded that the relationship between future closing prices, trading volume and open interest for three futures contracts traded on Nifty Stock Index Futures are having a causal relationship since the p-value is less than 0.05 for that rejects the null hypothesis.

Granger Causality test was used to find out the causal relationship future closing price, trading volume and open interest. Overall it can be concluded that there are high chances of predicting Open Interest from Trading Volume or vice-versa due to significant results from the causality test for almost all the stocks is evident. The Johansens's Co-integration test was used to examine the long run relationship and it was found that the variables of the study that is future closing price, trading volume and open interest have a long run equilibrium relationship between them. But in short run there may be deviations from this equilibrium and to verify whether such equilibrium converges to long run equilibrium or not. Thus VECM can be used to generate the short run dynamics. It was being reflected that there exist a short run relationship among the variables for the majority of stocks.

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