

Analysis of Stock Return, Trade Volume and Volatility of Select Indian Cement sector Stocks

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Abstract : The purpose of this study is to analyse the stock return, Trade volume and volatility of select cement companies in India. Ten cement companies are selected based on high market capitalization. Data was collected from www.nse.india.com the stock return, volume and volatility analysis gives great attention to the investors, stakeholders, policy makers. Some previous studies show that stock return, volume and volatility relationship is not detected and some other study showing the relationship between stock return, volume and volatility. For analyzing stock return, volume and volatility researcher use beta, correlation, ARCH, GARCH, co integration and Granger causality tests are used. Beta value of all companies shows the volatility of select stocks. The correlation result clearly indicates that stock return and volume are positively correlated but stock return, volume and value shows the highest relationship. Similarly causality test also proves the same result.

IndexTerms – Stock return, Volume, Volatility, ARCH, GARCH, Granger causality

I. INTRODUCTION

The issue of stock return, volume and volatility has gained a remarkable attention among academics, investors and researchers due to portfolio positioning and liquidity of their investment. However the issue remains deceptive with regard to weather symmetric or asymmetric impact of internal and external factors affecting market in developing and developed country. In general phenomenon that higher volatility gives higher return. In the world, India has emerged as a second largest producer of cement after china. Every year India's cement industry alone providing a employment for more than a million people, this industry play a vital part of the countries economy, the Indian cement industry was deregulated in 1982, and this industry has attracted huge investments from Indian as well as foreign investors. infrastructure is one of the key development sector in indian economy. This sector is responsible for the development and got intense focus from the Government for policies that would create a world class infrastructure. This sector includes building a bridges, dams, power and roads. Around 13 percentage of cement are consumed by this sector. India is receiving a Foreign direct investment (FDI) for construction sector and cement sector so that several foreign players such as Heidelberg Cement, Lafarge-Holcim, and Vicat have invested in India and some of the Indian Government initiatives like smart cities are boost this sector. another important factor which support the growth of this sector is the availability of the raw materials for making cement, such as limestone and coal. Housing sector contributing more to this sector, around 65 percentage of cement are consumed for the purpose of building houses. The total production capacity of the cement in India is 435 million tons (MT)

1.2 National Stock Exchange

National Stock Exchange is the leading index of the Indian Stock market, popularly known as NIFTY 50 or Standard & Poor's CRISIL NSE Index(S&P CNX Nifty). Nifty stocks consist of 23 different economic sectors. One of the sectors which have active trading in the National Stock Exchange is the Banking sector.

2. 1. Review of literature

M. Hakan Berument and Nukhet Dogan (2010) their study entitled "Stock market return and volatility: day-of-the-week effect" examines the stock market returns and volatility relationship using US daily returns from May 26, 1952 to September 29, 2006. The empirical analysis reveals that return-volatility relationship does not present during the study period and the similar result uptained from the day of the week effect also.

Ravinder Kumar Arora, Himadri Das and Pramod Kumar Jain their study entitled "Stock Returns and Volatility: Evidence from Select Emerging Markets" this study examine the behavior of stock returns and volatility of 10 emerging markets and compares them with those of developed markets. Different measures of frequency (daily, weekly, monthly and annual) were used over the period of 2002 to 2006. Sample statistics for all emerging and developed markets stock returns were indicate that return distributions are not normally distributed and return volatility shows clustering. The ratios of mean return to volatility for emerging markets were found to be higher than the developed markets.

Suman Gulia study entitled "Testing of Relationship Between Trading Volume, Return and Volatility" This paper presents an empirical analysis of the relationship between trading volume and stock return volatility in the Indian stock market. They found that The relationship between price change and volume, irrespective of the direction of the price change, was significant across three measures of daily trading volume for the aggregate market and was significant for individual stocks.

Muhammad Saeedullah* and Dr. Kashif-ur-Rehman study entitled "An Empirical Analysis of Market and Industry Factors in Stock Returns of Pakistan Pharmaceutical Industry" This paper attempts to develop a multi-index model for the Pharmaceutical industry of Pakistan. The model consists of five predetermined market and industry variables which are likely to affect stock

returns of Pharmaceutical firms. The independent variables are Return of Karachi Stock Exchange (KSE) 100 index, Consumer Price Index (CPI), Industrial Production Index (IPI), Risk Free Rate of Return (RFR) and Pharmaceutical Exports (EXP). The study proved that proved that stock returns of Pakistan Pharmaceutical industry can be explained using single index model. But using multi index model adds additional explanatory power to the model as there is a slight improvement in the R square (R²).

2.2 Problem of the study

Number of studies has been conducted to analyse the relationship between stock return, volume and Volatility in various aspects. Few previous studies proved strong relationship between stock return, Volume and volatility and some studies shows negative relationship and drawbacks related to factors of the study and innovations of the research. It leads to mixed empirical result between stock return, volume and volatility. And asymmetry relation proved to exist between stock return and volume. Good news will increase the stock return thus increase the return leads to increase the volume and bad news will reduce the stock return volatility. So present study aims to investigate the Stock return, Volume and volatility of selected cement sector stocks in India

2.3 Objectives

To evaluate the stock return and volatility of selected cement companies stocks in India

To study the existence of serial correlation in select companies

To investigate the relationship between stock return, Volume and volatility of leading Cement companies in India

2.4 Hypothesis of the study

H0: the selected companies stock return, Volume, Value and trade are independently distributed or they exhibit no serial correlation

H1: the selected companies stock return, Volume, Value and trade are not independently distributed or they exhibit serial correlation

H0: selected companies stock return series are stationary.

H1: selected companies stock return series are not stationary.

H0: There is no co integration between stock return & Volume, Stock return & value and stock return and trade

H1: There is a co integration between stock return & Volume, Stock return & value and stock return and trade

3. RESEARCH METHODOLOGY

The Research Methodology is systematic plan for research and method that how the study is conducted. This includes population, sample selection, Data, Sources of Data, study's variables and tools used for the analysis are given in this section

3.1 Population and Sample

For the purpose of the study, the data set comprises daily stock return and trading volume of 10 cement companies traded in National Stock Exchange. These companies reflect the Indian Cement sector efficiency and performance. The sample companies were selected based on high market capitalization.

3.2 Data and Sources of Data

Data collected for the study is purely secondary in nature. The daily closing prices and Volume traded have been collected from the website of National Stock Exchange. The daily share price for the sample companies are collected from 1st April 2015 to 31st July, 2018. The sample companies are Ultra Tech Cement Ltd, Ambuja Cements Ltd, ACC Ltd, India Cements Ltd, Shree Cements Ltd, The Ramco Cements Ltd, Birla Corporation Ltd, J. K. Cement Ltd, JK Lakshmi Cement Ltd, OCL India Ltd,

3.3 Theoretical framework

The variables used for this study are Stock return, trading volume, and Volatility. Trading volume includes Volume, Trade and Value. While analyzing the relationship between Trading Volume and return, Total value of Shares (Value), Daily number of equity trades (Trades), daily number of shares traded (Volume) are used as dependent variable,

3.4 Statistical tools used for the analysis

This section elaborate the proper statistical/econometric/financial models which are being used to forward the study from data towards inferences. The detail of methodology is given as follows.

3.4.1 Stock return

The first step is to calculate daily stock returns where the stock return is defined as the natural logarithm of the first difference of closing stock price every day as shown in Equation (1) below:

$$R_t = \ln (P_t / P_{t-1}) \text{ ----- (1)}$$

Where R_t represents the stock return in time t ; P_t is the closing stock price at the end of month t , and; P_{t-1} is the closing stock price at the end of month $t-1$.

3.4.2 Trading Volume

Trading volume is the most commonly used in Literature? For the purpose of this study trading volume is utilized as natural logarithm of trading volume at time t as indicated in Equation (2). The use of natural logarithm on trading volume would improve the normality

$$V_t = \ln (V_t) \text{ -----(2)}$$

Where V_t is the volume at time t . to avoid heterodascasity, both variables like trading volume and stock return must be converted into natural logarithm. If the variable in log form The variables can estimating elasticity.

3.4.3 Descriptive Statistics

I. **Standard Deviation** - Standard deviation is used as a tool for measuring the risk, which is a measure of the variables around its mean.

II. **Skewness** : Skewness is a measure of symmetry or more precisely the lack of symmetry. if the data set looks the similar to the left and right of the center point. The distribution shows symmetric

III. **Kurtosis** : Kurtosis is a measure of whether the data are heavy-tailed or light-tailed relative to a normal distribution. That is, data sets with low kurtosis be likely to have light tails or or lack of outliers, and data set with high kurtosis be likely to have high tails or outliers. A uniform distribution would be the extreme case

3.4.4 Beta - The beta coefficient is the relative measure of sensitivity of an asset's return to change in return on the market portfolio. For the purpose of cal;culating Beta Nifty index was used to find the degree of responsiveness of the securities returns with the market return. Volatility is explained using standard deviation and beta.

3.4.5 Pearson r correlation:

Pearson r correlation is used to measure the degree of the relationship between linearly related variables. For the purpose of this study correlation has been measuring the relationship between the variables of stock return , volume, trade and value. The formula is used to calculate the Pearson r correlation is:

Where r = Pearson r correlation coefficient, N = number of observations, $\sum xy$ = sum of the products of paired scores, $\sum x$ = sum of x scores, $\sum y$ = sum of y , $\sum x^2$ = sum of squared x , $\sum y^2$ = sum of squared y

3.4.6 Stationary or Unit root test

A. ADF Test: The augmented Dickey-Fuller or the ADF test is one of the techniques to test for the stationarity of a time series. the time series is a reflection of residuals series. It tells us the probability of time series are not being stationary. The P value is nothing but the probability value'. the ADF test formula is

- No constant, no trend: $\Delta y_t = \gamma y_{t-1} + v_t$
- Constant, no trend: $\Delta y_t = \alpha + \gamma y_{t-1} + v_t$
- Constant and trend: $\Delta y_t = \alpha + \gamma y_{t-1} + \lambda t + v_t$

Where, γy_{t-1} is the first different operator, α is a constant, v_t is the coefficient on a time trend λt is the coefficient on a squared time trend

B. KPSS Test : The Kwiatkowski–Phillips–Schmidt–Shin (KPSS) test figures out when a time series is stationary or linear trend, or non-stationary due to a unit root. mean and variance are constant over time in stationary time series. The base of KPSS test is linear regression. It divided into three parts: a random walk (rt), a deterministic trend (βt), and a stationary error (ϵt), with the regression equation:

$$x_t = rt + \beta t + \epsilon t.$$

If the data is stationary, data will have a fixed element for an intercept or the series will be stationary around a fixed level. The test uses OLS which differs slightly depending on whether you want to test for level stationarity or trend stationarity (Kocenda & Cerný). To test level stationarity A simplified version without the time trend component is used.

3.4.7 ARCH Engle's Test

The ARCH Engle's test is constructed based on the fact that the residuals are heteroskedastic and the squared residuals are auto correlated. The first test is to examine whether the square residuals are a sequence of white noise, which is called Portmanteau Q test and its similar to the Ljung-Box test on the squared residuals. The second type of test proposed by Engle (1982) is the Lagrange Multiplier test this test examine whether the fitted model is significant.

3.4.8 GARCH:

The simplest GARCH (1,1) specification are

$$\sigma_t^2 = \omega + \alpha \epsilon_{t-1}^2 + \beta \sigma_{t-1}^2 \quad \text{----- 1}$$

$$\sigma_t^2 = \omega + \alpha \epsilon_{t-1}^2 + \beta \sigma_{t-1}^2 \quad \text{----- 2}$$

The mean equation given in 1 was written as a function of exogenous variables with an error term. Since one-period ahead forecast variance is it is called the conditional variance. The conditional variance equation specified in equation 2. is constant term, is ARCH term and is the GARCH term.

The GARCH(1, 1) refers to the presence of a first-order autoregressive GARCH term and a first-order moving average ARCH term. In ordinary ARCH model, conditional variance equation shows that no lagged forecast variances.

3.4.9 cointegration test: The general rule is that when combining two integrated variables the combination will always be integrated. The most common order of integration in time series is either zero or one (Brooks, 2008); Two variables are

cointegrated if they share a common stochastic trend in the long-run. The consequent regression model includes two I(1) non-stationary variables y_t and x_t :

$$y_t = \mu + \beta x_t + u \text{ ----- 1}$$

If the OLS estimate β in such a case the linear combination of y_t and x_t are stationary, these two variables are co integrated. The error term between them is then stable over time (stationary):

$$u_t = y_t - \beta x_t \text{ ----- 2}$$

In order to co integrate of two variables they need to be integrated at the same order. For example if one variable is I(1) and the other one is I(0), they cannot be cointegrated. The highest order of combination of the two variables will take over and cointegration will not exist. Stock market returns, volume and volatility are the focus of this research.

3.4.10 Granger causality test

The Granger (1969) approach to give the solution to the question of whether x causes y . and how much of the current y can be elucidate by past values of y and then adding lagged values of x can improve. Here two-way causation is normally the case; x Granger causes y and y Granger causes x . It is important to note that the statement “ x Granger causes y ” need not be y is the effect of x . Granger causality measures priority and information content but does not by itself point out causality in the more common use of the term.

IV. RESULTS AND DISCUSSION

4.1 Results of Descriptive Statics of Selected cement companies stock return

Table 4.1: Descriptive Statics

	Company	Mean	Std. Dev.	Skewness	Kurtosis	N
1	Ultra Tech Cement Ltd	-0.0434	1.5486	-0.1470	4.2628	824
2	Ambuja Cements Ltd	-0.0176	1.6286	0.0502	4.7367	824
3	ACC Ltd	-0.0040	1.5207	0.7306	8.3572	824
4	India Cements Ltd	0.0350	2.8990	-0.4467	6.5916	824
5	Shree Cements Ltd	0.0548	1.8724	0.3540	4.5781	824
6	The Ramco Cements Ltd	0.1024	1.8184	0.6007	6.4403	824
7	Birla Corporation Ltd	0.0756	2.0945	0.9120	10.5522	824
8	J. K. Cement Ltd	0.0180	1.9195	0.6597	7.5045	824
9	JK Lakshmi Cement Ltd	-0.0109	1.8759	-0.1528	5.9048	824
10	OCL India Ltd	0.1163	2.1869	0.9593	10.9698	824

The table 4.1 shows that the descriptive statistics of selected companies. It reveals that Ultra tech cement Ltd, India cement Ltd and JK Lakshmi cement Ltd negatively skewed during the period. The negatives skewness indicates that the higher probability of earning negative return, remaining companies shows the positive skewness. All selected companies stock return shows the higher kurtosis (greater than 3). Higher kurtosis shows that the distribution of return has fat tails compared to normal distribution. This implies fat tails in volatility and is an indicator of ARCH effect.

4.2 Result of Beta for the selected Cement companies stock return

Table 4.2 Beta

Compan y Name	Ultra Tech Cement Ltd	Ambuja Cements Ltd	ACC Ltd	India Cements Ltd	Shree Cements Ltd	The Ramco Cements Ltd	Birla Corporatio n Ltd	J.K. Cement Ltd	JK Lakshmi Cement Ltd	OCL India Ltd
Beta	1.0721	1.09744	0.95281	2.22791	0.87965	0.90437	0.83583	0.77975	0.92885	0.4695

Table 4.2 shows the result of Beta co efficient for selected cement companies. Beta represents the tendency of a security's returns to respond to swings in the market. A security's beta should only be used when a security has a high R-squared value in relation to the benchmark. A beta of 1 indicates that the security's price moves with the market. A beta of less than 1 means that the security is theoretically less volatile than the market. A beta of greater than 1 indicates that the security's price is theoretically more volatile than the market. For calculating beta co efficient. Ultra Tech Cement Ltd, Ambuja Cements Ltd and India Cements Ltd beta value is higher than 1 it indicates the these companies share prices was more volatile than the market. Remaining all companies' beta value were less than 1 it shows the lower volatile than the market.

4.3 Result of Pearson correlation between Measures of daily stock return, trading volume, value and Trade

Table 4.3

	Company Name	Stocks return and Volume	Stock return and value	Stock return and Trade	Volume and value	Volume and Trade	Value and Trade
1	Ultra Tech Cement Ltd	0.0496	0.0563	0.0137	0.9567	0.8029	0.8044
2	Ambuja Cements Ltd	0.0880	0.0927	0.0962	0.9817	0.6827	0.6829
3	ACC Ltd	0.1974	0.1935	0.1491	0.9834	0.8268	0.8128
4	India Cements Ltd	0.1934	0.1572	0.1669	0.8932	0.8846	0.9234
5	Shree Cements Ltd	0.0944	0.0898	0.0771	0.9689	0.7919	0.7882
6	The Ramco Cements Ltd	0.1193	0.0985	0.1197	0.9590	0.7058	0.7728
7	Birla Corporation Ltd	0.2028	0.1752	0.1550	0.9857	0.8808	0.9023
8	J. K. Cement Ltd	0.2026	0.1887	0.1155	0.9760	0.6837	0.7135
9	JK Lakshmi Cement Ltd	0.0964	0.0985	0.0849	0.9858	0.6436	0.6413
10	OCL India Ltd	0.2614	0.2259	0.1690	0.9659	0.7621	0.7964

The table 4.3 shows that the correlation of stock return and Volume, stock return and Value, stock return and trade, Volume and value, Trading volume and trade, Value and trade was tested in this study. The result shows that stock return and Volume, stock return and value, stock return and trade shows positive linear relationship of 0 – 0.30. the result reveals that Volume and Value has a correlation of 0.90 and above is indicates that Volume and value has correlation. Volume and trade & value and trade shows a correlation between 0.60 to 0.90. it shows a strong positive relationship between Volume and trade & Value and trade of select sample companies.

4.4 – Result of ADF & Kpss test result for the selected cement companies stock returns

Table 4.4

Company	Test	Test stat	Prob	Unit root	Test	Test stat	Prob	
Ultra Tech Cement Ltd	ADF	-28.148	0	Unit root	Kpss	0.043	0	Non Stationary
Ambuja Cements Ltd	ADF	-29.516	0	Unit root	Kpss	0.084	0	Non Stationary
ACC Ltd	ADF	-29.037	0	Unit root	Kpss	0.074	0	Non Stationary
India Cements Ltd	ADF	-28.507	0	Unit root	Kpss	0.162	0	Non Stationary
Shree Cements Ltd	ADF	-28.086	0	Unit root	Kpss	0.083	0	Non Stationary
The Ramco Cements Ltd	ADF	-29.324	0	Unit root	Kpss	0.132	0	Non Stationary
Birla Corporation Ltd	ADF	-27.677	0	Unit root	Kpss	0.164	0	Non Stationary
J. K. Cement Ltd	ADF	-28.304	0	Unit root	Kpss	0.109	0	Non Stationary
JK Lakshmi Cement Ltd	ADF	-26.301	0	Unit root	Kpss	0.110	0	Non Stationary
OCL India Ltd	ADF	-29.093	0	Unit root	Kpss	0.118	0	Non Stationary

ADF Test & KPSS Test: The present table shows univariate unit root test result using ADF and KPSS test statistics. The ADF test KPSS test statistics result shows that all the selected companies stock returns are not stationary since p value is lower than the significance level one should reject the null hypothesis and accept the alternative hypothesis.

4.5 Result of Portmanteau Q test for selected cement companies stock return in India

Table 4.5

Ultra Tech Cement Ltd		Ambuja Cements Ltd		ACC Ltd		India Cements Ltd		Shree Cements Ltd		The Ramco Cements Ltd		Birla Corporation Ltd		J. K. Cement Ltd		JK Lakshmi Cement Ltd		OCL India Ltd	
Q st	Prob	Q st	Prob	QSt	Prob	Q-St	Prob	Q-St	Prob	Q-St	Prob	Q-St	Prob	Q-St	Prob	Q-St	Prob	Q-St	Prob
0.28	0.60	0.85	0.36	0.01	0.92	0.39	0.53	1.09	0.30	0.13	0.72	1.84	0.18	0.79	0.37	8.93	0.00	0.01	0.93
0.81	0.67	2.14	0.34	0.59	0.75	2.03	0.36	1.39	0.50	3.59	0.17	1.86	0.39	8.06	0.02	9.61	0.01	0.80	0.67

0.88	0.83	2.14	0.54	1.01	0.80	5.63	0.13	2.10	0.55	4.87	0.18	1.87	0.60	14.05	0.00	10.21	0.02	1.32	0.72
1.00	0.91	3.21	0.52	2.22	0.70	11.22	0.02	2.20	0.70	10.31	0.04	2.34	0.67	14.64	0.01	10.22	0.04	1.33	0.86
1.94	0.86	3.67	0.60	3.78	0.58	11.82	0.04	3.71	0.59	10.32	0.07	2.83	0.73	20.42	0.00	12.68	0.03	1.36	0.93
4.35	0.63	9.28	0.16	5.19	0.52	12.29	0.06	6.03	0.42	10.48	0.11	3.31	0.77	20.78	0.00	15.06	0.02	4.13	0.66
4.39	0.73	10.7 0	0.15	5.87	0.56	13.93	0.05	7.58	0.37	10.54	0.16	5.92	0.55	22.42	0.00	18.93	0.01	4.70	0.70
4.43	0.82	12.5 8	0.13	5.96	0.65	17.96	0.02	8.68	0.37	10.58	0.23	7.45	0.49	23.06	0.00	18.93	0.02	8.51	0.39
4.74	0.86	23.9 4	0.00	7.47	0.59	19.88	0.02	8.73	0.46	10.82	0.29	8.95	0.44	23.06	0.01	19.06	0.03	10.1 8	0.34
5.25	0.87	24.0 4	0.01	7.74	0.65	21.84	0.02	8.73	0.56	10.95	0.36	12.3 2	0.26	23.21	0.01	20.69	0.02	10.2 7	0.42
6.66	0.83	24.6 7	0.01	8.09	0.71	21.85	0.03	9.48	0.58	11.07	0.44	14.5 3	0.21	23.77	0.01	21.27	0.03	10.4 1	0.49
7.48	0.82	24.8 8	0.02	9.61	0.65	23.60	0.02	10.8 8	0.54	11.72	0.47	14.6 8	0.26	23.94	0.02	21.28	0.05	10.6 9	0.56

Portmanteau Q-Test performed on data set of select cement companies stock returns. In the mean equation only intercept is used and number of lags included is 12. Results of the test are presented in Table 4.5. residuals are extracted by applying the regression model of the different data of selected cement companies stock return in India. The extracted residuals were rotated to find out the effect of auto correlation using Q statistics. Serial correlation is a statistical term used to find out whether residual is correlated with lagged value of itself. The P value of India Cements Ltd, J. K. Cement Ltd and JK Lakshmi Cement Ltd are less than the critical value of 0.05, these companies return series shows the presence of ARCH effect. Remaining companies P value is greater than 0.05. it shows that time series are independently distributed.

4.6 Result of LM test for selected cement companies stock return in India

Table 4.6

Ultra Tech Cement Ltd		Ambuja Cements Ltd		ACC Ltd		India Cements Ltd		Shree Cements Ltd		The Ramco Cements Ltd		Birla Corporation Ltd		J. K. Cement Ltd		JK Lakshmi Cement Ltd		OCL India Ltd			
LM	Prob	LM	Prob	LM	Prob	LM	Prob	LM	Prob	LM	Prob	LM	Prob	LM	Prob	LM	Prob	LM	Prob	LM	Prob
0.73	0.46	-0.41	0.68	0.43	0.67	0.43	0.67	0.97	0.33	-0.10	0.92	1.41	0.16	0.95	0.34	2.92	0.00	8.32	0.00		
0.75	0.45	1.60	0.11	0.94	0.35	0.93	0.35	0.45	0.65	-1.53	0.13	0.29	0.77	2.50	0.01	0.45	0.66	-0.08	0.94		
0.42	0.67	0.62	0.54	0.85	0.40	2.08	0.04	-1.17	0.24	-1.10	0.27	0.15	0.88	2.39	0.02	0.67	0.50	0.89	0.38		
0.45	0.65	-0.91	0.36	-0.91	0.36	-2.49	0.01	-0.03	0.98	2.13	0.03	0.36	0.72	-1.44	0.15	-0.58	0.56	0.74	0.46		
0.88	0.38	0.59	0.56	1.06	0.29	-0.43	0.67	-1.24	0.22	-0.39	0.70	-0.46	0.65	1.97	0.05	1.86	0.06	0.25	0.80		
1.67	0.10	-2.63	0.01	-2.22	0.03	-0.69	0.49	-1.52	0.13	-0.58	0.56	0.53	0.59	-0.73	0.47	-1.95	0.05	0.32	0.75		
0.38	0.70	0.93	0.35	0.54	0.59	1.57	0.12	-0.83	0.41	0.08	0.94	1.89	0.06	1.21	0.23	-1.66	0.10	-1.86	0.06		
0.38	0.71	-1.32	0.19	-0.19	0.85	-1.81	0.07	-0.87	0.39	-0.76	0.45	1.10	0.27	0.27	0.79	0.28	0.78	-0.85	0.40		
0.48	0.63	3.11	0.00	1.35	0.18	0.98	0.33	0.41	0.68	0.06	0.95	-1.51	0.13	-0.23	0.82	-0.36	0.72	1.86	0.06		
0.72	0.47	0.30	0.76	-0.91	0.37	1.23	0.22	-0.36	0.72	-0.39	0.70	2.13	0.03	-0.17	0.87	1.27	0.21	-1.15	0.25		
1.33	0.18	-1.20	0.23	0.60	0.55	0.36	0.72	0.71	0.48	-0.61	0.55	-1.56	0.12	0.80	0.43	-0.99	0.32	-0.31	0.75		
1.30	0.20	0.22	0.82	1.15	0.25	1.06	0.29	1.02	0.31	-0.62	0.54	0.63	0.53	0.28	0.78	0.59	0.56	0.58	0.56		

For computing ARCH LM test, ordinary least square method is used to compute the residuals and square residuals of selected cement companies in India. The result is presented in the table 4.6, it shows that the data is suffering from the problem of heteroskedasticity. All the selected companies P value is higher than the critical value of 0.05. the table shows that the error variance is not constant over the time period taken for the study.

4.7 Result of GARCH Test for selected cement companies stock return in India

Table 4.7

	Company Name	α	α_1	β	$\alpha_1 + \beta$
1	Ultra Tech Cement Ltd	0.4828	-0.0166	0.5137	0.497

2	Ambuja Cements Ltd	0.4847	-0.0151	0.5159	0.501
3	ACC Ltd	0.4852	-0.0147	0.5164	0.502
4	India Cements Ltd	0.4845	-0.0153	0.5156	0.500
5	Shree Cements Ltd	0.4827	-0.0167	0.5136	0.497
6	The Ramco Cements Ltd	0.4892	-0.0087	0.5204	0.512
7	Birla Corporation Ltd	0.4888	-0.0104	0.5203	0.510
8	J. K. Cement Ltd	0.4848	-0.0150	0.5160	0.501
9	JK Lakshmi Cement Ltd	0.4850	-0.0148	0.5162	0.501
10	OCL India Ltd	0.4862	-0.0119	0.5174	0.505

The GARCH model used to estimates for the financial assets return data and sum of the co efficient of lagged square error and lagged conditional variance. The table 4.7 shows GARCH specification of volatility reduced the persistence of the conditional variance. ARCH (α_1) is lower than GARCH (β) it shows that volatility of stocks return is affected by past volatility more than the economic news and lagged conditional variance is close to 0.50. it implies that shocks in conditional variance will be persistent The variance intercept term 'C' is very small, and the 'ARCH parameter' is around 0.01 while the coefficient on the lagged conditional variance ('GARCH') is larger at 0.51.

4.8 a), result of Johansen co integration analysis for stock return and volume

Table 4.8 a)

Sl no	Company Name	No. of CE(s) = None				No. of CE(s) = At most one			
		Trace statistic	Critical value	Max Eigen statistic	Critical value	Trace statistic	Critical value	Max Eigen statistic	Critical value
1	Ultra Tech Cement Ltd	223.65	15.49	144.93	14.26	78.72	3.84	78.72	3.84
2	Ambuja Cements Ltd	193.53	15.49	136.85	14.26	56.67	3.84	56.67	3.84
3	ACC Ltd	183.83	15.49	134.85	14.26	48.98	3.84	48.98	3.84
4	India Cements Ltd	224.02	15.49	167.00	14.26	57.03	3.84	57.03	3.84
5	Shree Cements Ltd	237.84	15.49	170.05	14.26	67.79	3.84	67.79	3.84
6	The Ramco Cements Ltd	208.52	15.49	147.90	14.26	60.61	3.84	60.61	3.84
7	Birla Corporation Ltd	176.22	15.49	154.72	14.26	21.50	3.84	21.50	3.84
8	J. K. Cement Ltd	186.94	15.49	118.74	14.26	68.20	3.84	68.20	3.84
9	JK Lakshmi Cement Ltd	200.68	15.49	141.13	14.26	59.56	3.84	59.56	3.84
10	OCL India Ltd	179.72	15.49	149.06	14.26	30.65	3.84	30.65	3.84

4.8 b) Result of Johansen co integration analysis for stock return and value

Table 4.8 b)

Sl No	Company Name	No. of CE(s) = None				No. of CE(s) = At most one			
		Trace statistic	Critical value	Max Eigen statistic	Critical value	Trace statistic	Critical value	Max Eigen statistic	Critical value
1	Ultra Tech Cement Ltd	227.21	15.49	143.17	14.26	84.03	3.84	84.03	3.84
2	Ambuja Cements Ltd	190.54	15.49	137.76	14.26	52.78	3.84	52.78	3.84
3	ACC Ltd	174.08	15.49	133.96	14.26	40.12	3.84	40.12	3.84
4	India Cements Ltd	194.08	15.49	168.37	14.26	25.71	3.84	25.71	3.84
5	Shree Cements Ltd	217.71	15.49	170.20	14.26	47.51	3.84	47.51	3.84
6	The Ramco	180.48	15.49	149.02	14.26	31.46	3.84	31.46	3.84

	Cements Ltd								
7	Birla Corporation Ltd	170.09	15.49	155.42	14.26	14.67	3.84	14.67	3.84
8	J. K. Cement Ltd	165.00	15.49	119.46	14.26	45.53	3.84	45.53	3.84
9	JK Lakshmi Cement Ltd	189.28	15.49	138.75	14.26	50.53	3.84	50.53	3.84
10	OCL India Ltd	169.27	15.49	150.58	14.26	18.69	3.84	18.69	3.84

4.8 c) Result of Johansen co integration analysis for stock return and trade

Table 4.8 c)

Sl. No	Company Name	No. of CE(s) = None				No. of CE(s) = At most one			
		Trace statistic	Critical value	Max Eigen statistic	Critical value	Trace statistic	Critical value	Max Eigen statistic	Critical value
1	Ultra Tech Cement Ltd	226.72	15.49	152.54	14.26	74.18	3.84	74.18	3.84
2	Ambuja Cements Ltd	212.49	15.49	141.22	14.26	71.27	3.84	71.27	3.84
3	ACC Ltd	184.35	15.49	132.90	14.26	51.45	3.84	51.45	3.84
4	India Cements Ltd	207.37	15.49	166.54	14.26	40.83	3.84	40.83	3.84
5	Shree Cements Ltd	239.41	15.49	169.53	14.26	69.88	3.84	69.88	3.84
6	The Ramco Cements Ltd	183.31	15.49	148.79	14.26	34.52	3.84	34.52	3.84
7	Birla Corporation Ltd	173.78	15.49	154.61	14.26	19.17	3.84	19.17	3.84
8	J. K. Cement Ltd	180.63	15.49	119.37	14.26	61.26	3.84	61.26	3.84
9	JK Lakshmi Cement Ltd	187.10	15.49	135.13	14.26	51.97	3.84	51.97	3.84
10	OCL India Ltd	173.48	15.49	150.93	14.26	22.55	3.84	22.55	3.84

The result of co integration between stock return & volume, Stock return & value and Stock return & Trade are given in the table 4.8a, 4.8b, 4.8c of all selected cement companies stocks. All selected companies Trace statistics of stock return & volume, Stock return & value and Stock return & Trade were exceeds the critical value (15.49 and 3.84) in none and at most one. So the null of there is no co integrating vectors is rejected. The max Eigen test showed the confirmation of the result.

4.9 Result of Granger causality test for the selected variables

Table 4.9

	Company Name	Stock return to Volume		Stock return to value		Stock return to Trade		Conclusion
		Volume causes Return	Return causes Volume	Value causes Return	Return causes value	Trade causes Return	Return causes Trade	
1	Ultra Tech Cement Ltd	yes	Yes	Yes	Yes	No	Yes	Rejection at 5%
2	Ambuja Cements Ltd	No	No	No	No	No	No	Rejection at 5%
3	ACC Ltd	yes	No	Yes	NO	Yes	Yes	Rejection at 5%
4	India Cements Ltd	No	No	No	Yes	No	No	Rejection at 5%
5	Shree Cements Ltd	No	No	No	Yes	No	No	Rejection at 5%
6	The Ramco Cements Ltd	No	No	No	Yes	No	Yes	Rejection at 5%
7	Birla Corporation Ltd	No	No	No	Yes	No	Yes	Rejection at 5%
8	J. K. Cement Ltd	No	No	No	No	No	No	Rejection at 5%
9	JK Lakshmi Cement Ltd	Yes	No	No	Yes	No	Yes	Rejection at 5%
10	OCL India Ltd	No	Yes	No	Yes	No	Yes	Rejection at 5%

4.9 The results, show very little evidence of lead--lag interactions between the series. Some of the results shows any causality that is significant at the 5% level. Return cause of value is shown in the table except Ambuja Cements Ltd, ACC Ltd and J. K. Cement Ltd. It also depicts the stock return cause for trade six sample companies except Ambuja Cements Ltd, India Cements Ltd, Shree Cements Ltd and J. K. Cement Ltd but no causality from the opposite direction It is worth also noting that the term 'Granger causality' is something of a misnomer since a finding of 'causality' does not mean that movements in one variable physically cause movements in another. causality simply implies a chronological ordering of movements in the series.

Conclusion:

Analyzing the relationship between stock return, volume and volatility in financial market is more important for researchers, traders and policy makers. It helps many portfolio managers and traders to make better decision in short term and medium term horizon. Very few studies has been reported on this issue in emerging markets like India. This empirical study for cement sector stocks in Indian stock market. For the purpose of this study Ten cement companies was selected based on high market capitalization. It focus on stock return. volume and volatility of selected stocks. This study results shows that the positive correlation between price changes and volume , value and trade. Most of the stocks shows asymmetric behavior. Granger causality test shows past return does not show Granger cause trading volume but most of the company's stock return Granger cause for the value.

REFERENCES

- 1) Andersen, T. (1996). "Return volatility and trading volume: An information flow interpretation of stochastic volatility", *Journal of Finance*, 51, 169–204.
- 2) Ane, T. Amd Ureche-Rangau, L. (2008). "Does trading volume really explain stock returns volatility?", *Journal of International Financial Markets, Institutions, and Money*, 18, 216– 235.
- 3) Assogbavi, T. (2007) "Equity Price-Volume Relationship On The Russian Stock Exchange", *International Business & Economics Research Journal*, Vol 6, 9, 107-116.
- 4) Bhagat, S., Bhatia. S. (1996). "Trading Volume and Price Variability: Evidence on Lead-Lag Relations for Granger-Causality Tests", Working paper, University of Colorado at Boulder.
- 5) Bohl, M. T., and Henke, H. (2003). "Trading volume and stock market volatility: The Polish case", *International Review of Financial Analysis*, 12, 513–525
- 6) Brailsford, T. (1996). "The empirical relationship between trading volume, returns, and volatility", *Accounting and Finance*, 35, 89–111.
- 7) Chen, G. M., Firth, M., and Rui, O. M. (2001). "Dynamic relation between stock returns, trading volume, and volatility". *Financial Review*, 36, 153–73.
- 8) Crouch, R. L., (1970). "The volume of transactions and price changes on the New York Stock Exchange", *Financial Analysts Journal*, 26, 104-109.
- 9) Gallo, G., & Pacini, B. (2000). "The effects of trading activity on market volatility", *European Journal of Finance*, 6, 163–175.
- 10) Hiemstra, C., and Jones, J. D. (1994). "Testing for linear and non-linear Granger causality in the stock price–volume relationship". *Journal of Finance* 49:1639–64.
- 11) Karpoff, J.M., (1987). "The relation between price changes and trading volume: A survey", *Journal of Financial and Quantitative Analysis*, 22, 109-126
- 12) Morse, D. (1980). "Asymmetrical information in securities markets and trading volume", *Journal of Financial and Quantitative Analysis*, 15, 1129-1 148.
- 13) Ratner, M., and Leal, R. P. C. (2001). "Stock returns and trading volume: Evidence from the emerging markets of Latin America and Asia. *Journal of Emerging Markets*, 6, 5–22.
- 14) Rogalski, R.J. (1978). "The dependence of prices and volume", *Review of Economics and Statistics*, 60, 268-274.
- 15) Smirlock, M., and Starks, L. (1985). "A further examination of stock price changes and transaction volume", *Journal of Financial Research* 8, 217-225.
- 16) Smirlock, M., Starks, L.T. (1988). "An empirical analysis of the stock price-volume relationship", *Journal of Banking Finance*, 12, 1, 31-41.
- 17) Tauchen, G. E. and M. Pitts (1983). "The price variability-volume relationship on speculative markets", *Econometrica*, 51, 485-505.