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"The Relationship Between Trading Volume And Returns: Evidence From the Indian Future Market"

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ABSTRACT

This paper examines the relationship between Future trading volume and returns in National Stock Exchange and Bombay Stock Exchange. We study the Generalised Auto Regressive Conditional Heteroscedasticity (GARCH) effects in the data and test how well these effects are explained by trading volume. GARCH confirms that there is no evidence of positive relationship between trading volume and returns. These findings are useful to Financial Managers dealings Future in India.

INTRODUCTION

Time series data are the basis on which many predictions are made. Time series data tells that there exist variations between data over a period, when data are collected; In general, the new Information will help one to improve prediction of data movement in the future. But then volatility otherwise called variations prevail some extent in the occurrence of an event. Future market in India is no way different from this

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phenomenon. This study in general, aims at understanding the volatility pattern of future movement in Indian market.

OBJECTIVES

The Objectives are

1. To understand the time series nature of future trading in Indian Market.
2. To find the right models of Prediction with special reference to future market.
3. To evaluate the results arrived out of applying the models.

METHODOLOGY

Descriptive method of research is employed in this study. The major purpose of descriptive research is description of the state of affairs as it exist at present. The main characteristic of Ex-Post Facto research is that the researcher has no control over the variables; Researcher can only Report what has happened or what is happening. Ex Post Facto studies also include attempts by researcher to discover causes even when they cannot control the variables.

Secondary sources of data are used in this study. The NSE and BSE Websites (www.nseindia.com and www.bseindia.com) provide all data required for this study. In order to predict volatility of future and to study relationship between volatility and volume, Index return and Number of future traded are required. So month end closing price of S&P CNX Nifty, BSE Sensex and volume of future traded in NSE for the same period are selected for this study. The period covered is between April 2004 and March 2018.

STATISTICAL TOOLS

Statistical tools used in this study are as follows:

The Unit Root Test:

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A test of Stationary is the unit root test. It is a stochastic process. There are possibilities to test whether the series has random walk pattern alone or has random walk with drift around a stochastic trend. Dickey and fuller shows that under the null hypothesis that $\delta = 0$ (Unit root), the estimated t value of the Co-efficient of Y_{t-1} follows the tau statistics. Dickey and Fuller have calculated the critical value of tau statistics on the basis of Monte Carlo simulation. Mackinnon has prepared more extensive tables. They are now used as a ready reference to test the hypothesis.

The Augmented Dickey – Fuller (ADF) Test

In case the U_t is correlated, Dickey – Fuller has developed a test, known as the augmented Dickey – Fuller (ADF) Test. This test is conducted by "Augmenting" the existing equations by adding lagged values of the dependent variable ΔY_t. The ADF Test consists of estimating the following equation.

$$\Delta Y_t = \beta_1 + \beta_{2t} + \delta Y_{t-1} + \alpha \Sigma^{m}_{i-1} \Delta Y_{t-1} + \Sigma_1$$

Generalized Autoregressive Conditional Heteroscedasticity GARCH (1, 1) model:

Contemporaneous relationship between volatility and volume are analyzed by using GARCH (1, 1) model. We test how well GARCH effects are explained by trading volume and examine the effect of trading volume on conditional volatility.

The conditional variance equation of the GARCH (1, 1) Model is given by

$$\sigma_t^2 = \omega + \alpha_1 \varepsilon^2_{t-1} + \beta_1 \sigma^2_{t-1} + \gamma LnVol_t$$

Where $LnVol_t$ is the daily return of trading volume.

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We examine the contemporaneous relationship between trading volume and Total Index return using the following AR (1) – GARCH (1,1) model

$R_t = \mu + \alpha_1 R_{t-1} + \alpha_2 Lnvolt + \varepsilon_1$ (mean equation)

$\sigma_t^2 = \omega + \alpha_1 \varepsilon^2_{t-1} + \beta_1 \sigma^2_{t-1}$ (Variance Equation)

ANALYSIS AND INTERPRETATION

Transforming the series:

Number of future contract traded in the National Stock Exchange has been transformed as Logarithmic volume (Lvolume) for the study. This is done to ensure normality of the series.

Lvolume = log (volume $_t$ / volume $_{t-1}$) x 100

The volatility of the yield statistics is calculated with S&P CNX Nifty of NSE. Estimated the return by using the log operator has given below.

LNSE = log (NSE $_t$ / NSE $_{t-1}$) x 100

The volatility of the yield statistics is calculated with Sensex of BSE. Estimated the return by using the log operator has given below.

LBSE = log (BSE $_t$ / BSE $_{t-1}$) x 100

TABLE – 1

STATISTICS FOR NSE S&P CNX NIFTY NSE

	LFUTURE	LNSE
Mean	0.080714	0.020253
Median	0.057330	0.029189
Maximum	0.774888	0.152106
Minimum	-0.227625	-0.187426
Std. Dev.	0.166608	0.068713
Skewness	1.058576	-0.713962
Kurtosis	5.939330	3.471409

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Jarque-Bera	36.63222	6.312505
Probability	0.000000	0.042585
Sum	5.407840	1.356984
Sum Sq. Dev.	1.832050	0.311621
Observations	67	67

Logarithmic volume has positive skewness, positive kurtosis and high J- B statistics. This implies that the distribution is skewed to the right and that the PDF is Leptokurtic. The J-B statistics test indicates the normality is exists.

Logarithmic total return index of NSE have negative skewness, Positive kurtosis and lower value of J – B statistics (still rejecting normality). Hence summary statistics for total return index of NSE show that distribution is skewed to the left and normality is exists.

TABLE – 2

STATISTICS FOR BSE SENSEX

	LBSE	LFUTURE
Mean	0.020260	0.080714
Median	0.023803	0.057330
Maximum	0.146191	0.774888
Minimum	-0.172388	-0.227625
Std. Dev.	0.066349	0.166608
Skewness	-0.726713	1.058576
Kurtosis	3.369648	5.939330
Jarque-Bera	6.278703	36.63222
Probability	0.043311	0.000000
Sum	1.357420	5.407840
Sum Sq. Dev.	0.290543	1.832050
Observations	67	67

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Logarithmic total return index of BSE have negative skewness, Positive kurtosis and lower value of J – B statistics (still rejecting normality). Hence summary statistics for total return index of BSE show that distribution is skewed to the left and normality is exists.

TABLE – 3

UNIT ROOT TEST: VOLUME

Null Hypothesis: LFUTURE has a unit root

Exogenous: None

Lag Length: 2

	t-statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.380464	0.0010
Test critical values:		
1% level	-2.601596	
5% level	-1.945987	
10% level	-1.613496	

*MacKinnon (1996) one-sided p-values

Since t statistics observation are less than Mackinnon one sided P – values at 1 %, 5% and 10% the unit root does not exist.

Logarithmic No. of future contract (trading volume) are stationery.

TABLE – 4

UNIT ROOT TEST: S&P CNX NIFTY NSE

Null Hypothesis: LNSE has a unit root

Exogenous: None

Lag Length: 0

	t-statistic	Prob.*
Augmented Dickey-Fuller test statistic	-7.100727	0.0000
Test critical values:		
1% level	-2.600471	
5% level	-1.945823	
10% level	-1.613589	

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*MacKinnon (1996) one-sided p-values

Since t statistics observation are less than Mackinnon one sided P – values at 1 %, 5% and 10% the unit root does not exist.

Logarithmic Total returns index of NSE are stationery.

TABLE – 5

UNIT ROOT TEST: BSE SENSEX

Null Hypothesis: LBSE has a unit root

Exogenous: None

Lag Length: 0

	t-statistic	Prob.*
Augmented Dickey-Fuller test statistic	-7.331794	0.0000
Test critical values:		
1% level	-2.600471	
5% level	-1.945823	
10% level	-1.613589	

*MacKinnon (1996) one-sided p-values

Since t statistics observation are less than Mackinnon one sided P – values at 1 %, 5% and 10% the unit root does not exist.

Logarithmic Total returns index of BSE are stationery.

TABLE – 6

GARCH (1, 1) MODEL: CONDITIONAL VARIANCE EQUATION

GARCH = c+ α*RESID (-1) ^2 +β *GARCH (-1) + γ l volume

Dependent Variable: LNSE

Method: ML - ARCH (Marquardt) - Normal distribution

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Included observations: 67 after adjustments

Failure to improve Likelihood after 17 iterations

Variance back cast: ON

GARCH = ω+ α*RESID (-1) ^2 +β *GARCH (-1) + γ l volume

	Coefficient	Std. Error	z-Statistic	Prob.
C	0.023276	0.006804	3.420915	0.0006
LFUTURE	-0.037325	0.038484	-0.969884	0.3321
Variance Equation				
C	0.002281	0.004047	0.563679	0.5730
RESID(-1)^2	-0.117761	0.125308	-0.939769	0.3473
GARCH(-1)	0.599116	0.917637	0.652890	0.5138

Investigating whether trading volume has any explanatory power for total return index of NSE by fitting a GARCH (1, 1) model with volume included in the conditional variance equation. The parameter γ (- 0.037325) is negative and statistically insignificant (i.e. there is not a positive effect), indicating also that it is not reflective at the contribution of volume explaining the GARCH effect in NSE. In other words the volume does not contribute significantly in explaining GARCH effect.

TABLE – 7

GARCH (1, 1) MODEL: MEAN EQUATION

Dependent variable L BSE

Method ML – ARCH (Marquardt) – Normal distribution

$NSE_t = \mu + \alpha_1 NSE_{t-1} + \alpha_2$ L volume + ε_1

GARCH = ω+ α*RESID (-1) ^2 +β *GARCH (-1) + γ l volume

	Coefficient	Std. Error	z-Statistic	Prob.
GARCH	-5.378115	5.915610	-0.909139	0.3633
C	0.044466	0.023748	1.872429	0.0611
LFUTURE	0.033420	0.075443	0.442977	0.6578
Variance equation				

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C	0.000799	0.000531	1.503674	0.1327
RESID(-1)^2	-0.105885	0.094077	-1.125512	0.2604
GARCH(-1)	0.916933	0.033183	27.63296	0.0000

Testing the contemporaneous relationship between trading volume in total index return of BSE using GARCH (1, 1) model with the volume included the mean equation only. Trading volume coefficient (- 5.378115) are negative and statistically insignificant (i.e.) there is no positive contemporaneous relationship between trading volume and total index return of BSE.

TABLE – 8

GARCH MODEL (1, 1): CONDITIONAL VARIANCE EQUATIONS

GARCH (1, 1) model GARCH = ω+ α*RESID (-1) ^2 +β *GARCH (-1) + γ l volume

Dependent Variable: LBSE

Method: ML - ARCH (Marquardt) - Normal distribution

Included observations: 67 after adjustments

Convergence achieved after 23 iterations

Variance back cast: ON

GARCH = ω+ α*RESID (-1) ^2 +β *GARCH (-1) + γ l volume

	Coefficient	Std. Error	z-Statistic	Prob.
C	0.018996	0.010599	1.792345	0.0731
LFUTURE	-0.010727	0.051603	-0.207871	0.8353
Variance Equation				
C	0.001624	0.000411	3.951877	0.0001
RESID(-1)^2	-0.141585	0.090168	-1.570233	0.1164
GARCH(-1)	0.746145	0.012640	59.03075	0.0000

Investigating whether trading volume has any explanatory power for total return index of BSE by fitting a GARCH (1, 1) model with volume included in the conditional variance equation. The parameter γ (- 0.010727) is negative and statistically insignificant (i.e. there is not a positive effect), indicating also that it is not reflective at the

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contribution of volume explaining the GARCH effect in BSE. In other words the volume does not contribute significantly in explaining GARCH effect.

TABLE – 9

GARCH MODEL (1, 1): MEAN EQUATION

Dependent variable L BSE

Method ML – ARCH (Marquardt) – Normal distribution

$BSE_t = \mu + \alpha_1 BSE_{t-1} + \alpha_2$ L volume + ε_1

GARCH = ω+ α*RESID (-1) ^2 +β *GARCH (-1) + γ l volume

	Coefficient	Std. Error	z-Statistic	Prob.
GARCH	-6.255770	6.052581	-1.033571	0.3013
C	0.043531	0.023556	1.847957	0.0646
LFUTURE	0.043273	0.066132	0.654342	0.5129
Variance Equation				
C	0.000813	0.000484	1.681770	0.0926
RESID(-1)^2	-0.121516	0.083956	-1.447378	0.1478
GARCH(-1)	0.909407	0.044651	20.36713	0.0000

Testing the contemporaneous relationship between trading volume in total index return of BSE using GARCH (1, 1) model with the volume included the mean equation only.

Trading volume coefficient (- 6.255770) are negative and statistically insignificant (i.e.) there is no positive contemporaneous relationship between trading volume and total index return of BSE.

FINDINGS AND CONCLUSIONS:

The relationship between return and trading volume has interested financial economists and analysts for a number of years. A widely documented result is the positive contemporaneous relationships between price returns and trading volume. The two most important theoretical models, which have been used to explain this relationship,

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are the "Mixture of distribution hypotheses" (MDH) and "Sequential Information arrival hypotheses"

The study investigates the contemporaneous relationship between volume and returns in National stock exchange and Bombay stock exchange.

Using GARCH Models, the results for S & P CNX Nifty, NSE show Negative and insignificant effect, indicating that volume does not contribute significantly in explaining the conditional variance and there is no positive contemporaneous relationship between trading volume and returns.

Using GARCH Models, the results for Sensex, BSE show Negative and insignificant effect, indicating that volume does not contribute significantly in explaining the conditional variance and there is no positive contemporaneous relationship between trading volume and returns.

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