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OBJECTIVES

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RESULTS & DISCUSSION

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- Hunker, H.L. and A.J. Wright (1963), "Factors of Industrial Location in Ohio" Ohio State University, Nigeria.

CONTRIBUTIONS TO BOOKS

- Sharma T., Kwatra, G. (2008) Effectiveness of Social Advertising: A Study of Selected Campaigns, Corporate Social Responsibility, Edited by David Crowther & Nicholas Capaldi, Ashgate Research Companion to Corporate Social Responsibility, Chapter 15, pp 287-303.

JOURNAL AND OTHER ARTICLES

- Schemenner, R.W., Huber, J.C. and Cook, R.L. (1987), "Geographic Differences and the Location of New Manufacturing Facilities," Journal of Urban Economics, Vol. 21, No. 1, pp. 83-104.

CONFERENCE PAPERS

- Garg, Sambhav (2011): "Business Ethics" Paper presented at the Annual International Conference for the All India Management Association, New Delhi, India, 19–23

UNPUBLISHED DISSERTATIONS

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A STUDY ON ASSOCIATION AND CAUSALITY RELATIONSHIP BETWEEN NSE EQUITY SPOT AND DERIVATIVE MARKETS

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ABSTRACT

Financial derivative market plays an important role in driving the market stability, liquidity and depth at spot market through F&O product trade. Many studies attempted to understand the relationship between spot and derivative markets through stock prices at both markets. Trade volumes data has greater power to quantify the market activity rather than price data alone and this study considered daily trade volumes data across two markets for analysis. This study selected four years of EOD trade volumes of both spot and derivative markets for assessing the association and causality using ARDL bound test and Toda-Yamamoto methodology under Augmented VAR system. ARDL bound test resulted in strong long run co-integration relationship between two markets with significant and negative co-integration coefficient of -0.13 and Toda-Yamamoto method of granger causality concluded the bi-directional causality suggesting both markets trade activity respond each other and adjust very quickly within a day trade since the daily data tested for the study.

KEYWORDS

ARDL bound test, augmented VAR, error correction model, granger causality, Toda-Yamamoto methodology.

INTRODUCTION

NSE has become a prominent player in providing financial derivatives in India with a strong and well matured market mechanism with sophisticated technology. Financial derivative market plays an important role in driving the market stability, liquidity and depth at spot market through F&O product trade. Intensive research has been done in assessing the relationship between equity spot and derivative markets at NSE and provided implications for development of these markets. Yet the observed results are inconclusive as the methodologies are time varying and data also providing signals that are not consistent. Further these previous studies are aimed to understand the relationship between derivatives and equity market trade for specific securities via security prices to assess the cause and effect relation between the markets.

This paper is aimed at understanding the properties of the market trade data of both spot and F&O markets and to identify the underlying relationship between well-argued cash and F&O markets at NSE. The long run association between two markets observed through co-integration study and the causality relationship under VAR environment. Many studies attempted to identify the relationship between the two markets by analysing price data. Trade volumes data has greater power to quantify the market activity rather than price data alone and this study considered daily trade volumes data across two markets for analysis.

This study seeks the strength of long run association between two markets and provides the long run model for forecasting. Further it provides the basis for applying appropriate tool in identifying causality relation as it is the precondition to identify long run association (co-integration) to decide upon VAR or VECM technique for causality test.

LITERATURE REVIEW

Many studies attempted to understand the relationship between spot and derivative markets through stock prices at both markets. Kwaller, Koch and Koch (1987) found that the S&P 500 futures market lead its spot market by 1 minute and spot market leads the futures over 20 minutes. Ghosh (1993) found the co integration to assess the price discovery in S&P 500 futures and its spot market and concluded that the futures are superior in price discovery. Tse (1995) used VECM model for assessing NIKKI 225 futures and its spot market relation and found the unidirectional causality from futures to spot market.

Raju and Karande (2003) examined NSE Nifty and its futures using co-integration and error correction models and found that bidirectional causality exists. Similarly, Sah and Kumar (2006) deployed co integration and error correction model on daily data series from 2000 to 2005 and concluded bidirectional causality. Mukarjee and Mishra (2006) employed cross correlation and error correction model on intraday data and found similar result of bi directional causality.

Theoretically it is assumed that the both markets to be co-integrated in long run. The lead lag relationship between the markets can be assessed using granger causality test under VAR environment for which the data to be studied must be stationary and the variables must be integrated of same order. Further it is necessary to identify whether the variables are co-integrated together or not to identify and apply appropriate tool for analysing causality. Basing on the result from the co-integration test, we must proceed with vector autoregressive model (VAR) or vector error correction model (VECM) to assess causality relationship.

VAR or VECM model uses WALD test for checking causality which hold the estimates accurate only when the data is stationary. Thus it is necessary to have data series stationary at same order of integration. If it fails to satisfy this precondition, then testing VAR or VECM model for causality leads to wrong estimates and becomes inconclusive.

METHODOLOGY AND ANALYSIS

Daily trade volumes for past four years i.e. from 2012 to 2015 for both markets are taken for studying the long run association and causality test. The data was adjusted for outliers and accounted for 1000 observations approximately after adjustment made. Since the FO daily trade volumes declines as near month expiry date approaches, it exhibits cyclical trend. FO trade volumes are non-stationary at level but it is trend stationary (see table I.A). Trade volumes from spot market exhibit stationary trend over the observation period.

To proceed with co-integration test, we must check the data stationary and order of integration. Augmented dickey-fuller test (ADF) applied to test the data series stationary for both the time series CASH VOLUMES and FO VOLUMES. Table I.A & Table I.B exhibits that the CASH market volumes are stationary at level but FO VOLUMES are not. This leaves us johansen co-integration test inappropriate for testing co-integration as both the series are not integrated of same order.

TABLE I.A

Null Hypothesis: **FOVOLUME** has a unit root				
Exogenous: Constant				
Lag Length: 21 (Automatic - based on AIC, maxlag=21)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-1.72478	0.4184
Test critical values:	1% level		-3.43704	
	5% level		-2.86438	
	10% level		-2.56834	
*MacKinnon (1996) one-sided p-values.				

TABLE I.B

Null Hypothesis: **CASHVOLUME** has a unit root				
Exogenous: Constant				
Lag Length: 8 (Automatic - based on AIC, maxlag=21)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-4.45983	0.0002
Test critical values:	1% level		-3.43684	
	5% level		-2.86429	
	10% level		-2.56829	
*MacKinnon (1996) one-sided p-values.				

The ARDL Bounds test for co integration was coined by Pesaran and Shin (1998). This method gives stable results than Johansen co integration test for variables that are not integrated of same order. Further this method is not requiring the unit root test for variables for stationarity as long as they are not I(2). It can handle the series of variables that are I(0) and I(1) in nature and thus it is more dynamic than the Johansen-Juselius technique for co integration which requires all series to be integrated of the same order.

ARDL model and bound test is appropriate and can be applied to data series that are not integrated of same order to test the co-integration. But the precondition for proceeding to ARDL model and bound test is that the series of data must not I(2). Again ADF test applied to both the series at first difference (I(1)) to test for stationary and obtained result (see tables I.C & I.D) that both the series are stationary at I(1) which suggest the rejection of hypothesis that they are I(2). This indicates that we can proceed with ARDL model bound test.

TABLE I.C

Null Hypothesis: **D(FOVOLUME)** has a unit root				
Exogenous: Constant				
Lag Length: 20 (Automatic - based on AIC, maxlag=21)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-13.6244	0
Test critical values:	1% level		-3.43704	
	5% level		-2.86438	
	10% level		-2.56834	
*MacKinnon (1996) one-sided p-values.				

TABLE I.D

Null Hypothesis: **D(CASHVOLUME)** has a unit root				
Exogenous: Constant				
Lag Length: 13 (Automatic - based on AIC, maxlag=21)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-12.1385	0
Test critical values:	1% level		-3.43688	
	5% level		-2.86431	
	10% level		-2.5683	
*MacKinnon (1996) one-sided p-values.				

To select the best fit model of autoregressive distributive lag (ARDL) model, we choose Akaike information criteria (AIC) in order to identify lag length for the model. This resulted in ARDL (4,4) model which has R-square value of 70.26%.

TABLE II.A: ARDL MODEL ESTIMATION FOR CASH VOLUMES AND FO VOLUMES

Dependent Variable: CASHVOLUME				
Method: ARDL				
Sample (adjusted): 1/06/2012 12/31/2015				
Included observations: 975 after adjustments				
Maximum dependent lags: 4 (Automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Dynamic regressors (4 lags, automatic): FOVOLUME				
Fixed regressors: C				
Number of models evalulated: 20				
Selected Model: ARDL(4, 4)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
CASHVOLUME(-1)	0.601928	0.032918	18.28581	0
CASHVOLUME(-2)	0.134779	0.038263	3.522455	0.0004
CASHVOLUME(-3)	0.079554	0.038088	2.088697	0.037
CASHVOLUME(-4)	0.053348	0.032727	1.630123	0.1034
FOVOLUME	20.81368	1.546356	13.45983	0
FOVOLUME(-1)	-7.43823	1.98623	-3.7449	0.0002
FOVOLUME(-2)	-8.13067	2.006235	-4.0527	0.0001
FOVOLUME(-3)	-2.80049	2.000192	-1.40011	0.1618
FOVOLUME(-4)	3.314502	1.664713	1.991035	0.0468
C	65075308	16405567	3.96666	0.0001
R-squared	***0.702599***	Mean dependent var		7.79E+08
Adjusted R-squared	0.699825	S.D. dependent var		2.33E+08
S.E. of regression	1.28E+08	Akaike info criterion		40.18118
Sum squared resid	1.58E+19	Schwarz criterion		40.23125
Log likelihood	-19578.3	Hannan-Quinn criter.		40.20023
F-statistic	253.3085	Durbin-Watson stat		2.002936
Prob(F-statistic)	0			
*Note: p-values and any subsequent tests do not account for model selection				

To test the validity of the model one must check the error term for serial correlation of the model. Q Statistic analysis made in order to identify the serial correlation in the model and obtained results shown in the table II.B suggesting no serial correlation in the error term from the model. It indicates the estimated parameters are valid and unbiased and can be used for estimation model.

TABLE II.B: SERIAL CORRELATION TEST FOR RESIDUALS FROM ARDL MODEL

Sample: 1/02/2012 12/31/2015						
Included observations: 975						
Q-statistic probabilities adjusted for 4 dynamic regressors						
Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
| |	| |	1	-0.001	-0.001	0.0005	0.983
| |	| |	2	0.001	0.001	0.0022	0.999
| |	| |	3	-0.001	-0.001	0.0033	1
| |	| |	4	-0.027	-0.027	0.7282	0.948
| |	| |	5	-0.004	-0.004	0.7417	0.981
| |	| |	6	-0.015	-0.015	0.9645	0.987
| |	| |	7	-0.063	-0.064	4.9315	0.668
| |	| |	8	-0.033	-0.034	6.005	0.647
| |	| |	9	0.06	0.06	9.5025	0.392
| |	| |	10	0.034	0.034	10.664	0.384
| |	| |	11	0.003	-0.001	10.671	0.471
| |	| |	12	0.021	0.019	11.124	0.518
| |	| |	13	0.016	0.018	11.386	0.579
| |	| |	14	0.032	0.029	12.39	0.575
| |	| |	15	0.018	0.016	12.709	0.625
| |	| |	16	-0.014	-0.006	12.916	0.679
| |	| |	17	0.045	0.055	14.968	0.598
| |	| |	18	0.021	0.023	15.404	0.634
|* |	|* |	19	0.121	0.123	30.011	0.052
| |	| |	20	0.007	0.012	30.066	0.069
| |	| |	21	0.03	0.037	30.967	0.074
| |	| |	22	-0.007	-0.004	31.021	0.096
| |	| |	23	-0.006	-0.002	31.062	0.121
| |	| |	24	0.007	0.011	31.106	0.151
| |	| |	25	0.01	0.022	31.215	0.182
| |	| |	26	-0.005	0.006	31.237	0.22
| |	| |	27	0.046	0.051	33.393	0.184
| |	| |	28	0.018	0.008	33.721	0.21
| |	| |	29	0.012	0.004	33.87	0.244
| |	| |	30	0.002	-0.006	33.873	0.286
| |	| |	31	0.019	0.013	34.238	0.315
| |	| |	32	-0.03	-0.035	35.157	0.321
| |	| |	33	0.027	0.021	35.921	0.333
| |	| |	34	0.026	0.023	36.589	0.349
| |	| |	35	-0.049	-0.046	39.029	0.293
| |	| |	36	0.019	0	39.404	0.32
*Probabilities may not be valid for this equation specification.						

Further bound test conducted for identifying the co-integration between the markets and obtained F statistic of 23.39 which is much higher than the upper bound value of 7.34 at 1% significant level. This suggests the rejection of null hypothesis that CASH and FO market volumes are not co-integrated. Further the long run co-integration coefficient is significant and negative i.e. -0.13 suggest that the volumes of two markets adjust one to each other quickly. As there is long run relationship between CASH and FO markets, we can proceed to test the causality relationship using granger causality test under VECM environment. Since the variables are not integrated of same order, it may not be appropriate to test causality using granger test as explained earlier in this article. This problem can be addressed using the Toda- Yamamoto methodology of Granger causality test under augmented VAR in which the model is altered to test the granger causality so that Wald test results are valid and unbiased.

TABLE II.C: BOUND TEST FOR IDENTIFYING COINTEGRATION OF CASH AND FO MARKETS

ARDL Bounds Test		
Sample: 1/06/2012 12/31/2015		
Included observations: 975		
Null Hypothesis: No long-run relationships exist		
Test Statistic	Value	k
F-statistic	***23.39216***	1
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	4.04	4.78
5%	4.94	5.73
2.50%	5.77	6.68
1%	6.84	7.84

TABLE II.D: LONG RUN FORM OF COINTEGRATION OF CASH AND FO VOLUMES

ARDL Cointegrating And Long Run Form				
Dependent Variable: CASHVOLUME				
Selected Model: ARDL(4, 4)				
Date: 05/05/16 Time: 10:55				
Sample: 1/02/2012 12/31/2015				
Included observations: 975				
Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CASHVOLUME(-1))	-0.26768	0.035066	-7.63356	0
D(CASHVOLUME(-2))	-0.1329	0.035124	-3.78384	0.0002
D(CASHVOLUME(-3))	-0.05335	0.032727	-1.63012	0.1034
D(FOVOLUME)	20.81368	1.546356	13.45983	0
D(FOVOLUME(-1))	8.130671	2.006235	4.052702	0.0001
D(FOVOLUME(-2))	2.800489	2.000192	1.40011	0.1618
D(FOVOLUME(-3))	-3.3145	1.664713	-1.99104	0.0468
CointEq(-1)	***-0.13039***	0.020646	-6.31562	0
Cointeq = CASHVOLUME - (44.1657*FOVOLUME + 499079330.1139)				
Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
FOVOLUME	44.16567	10.59079	4.170196	0
C	4.99E+08	74485805	6.700328	0

Toda & Yamamoto (1995) developed the method for testing granger causality for a set of variables that are not integrated of same order irrespective of their co integration. Granger causality requires having variables integrated of same order to test causality under VAR and VECM subjected to co integration among variables. This TY method of causality does not require the variables integrated of same order and thus it is robust to the results of unit root tests for variables.

This test estimates a VAR equation with the lag length of S+M where "S" is the order of the well specified VAR model and "M" is the maximum order of integration of all the variables. Then a Modified Wald statistic is then computed testing whether the first "S" coefficients of each equation in VAR for each lagged variable in the system is significantly different from zero or not. This Modified WALD statistic follows the normal chi-square distribution with degree of freedom equal to the number of excluded lagged variables.

Since the above results from ARDL bound test of co integration confirming the long run association between cash and FO markets, there must be at least one way of causality exist between cash and FO markets and we proceed to test the direction of causality under the Toda-Yamamoto method of granger causality under augmented VAR environment.

TABLE III.A: LAG STRUCTURE IDENTIFICATION FOR VAR SYSTEM

VAR Lag Order Selection Criteria						
Endogenous variables: CASHVOLUME FOVOLUME						
Exogenous variables: C						
Date: 05/05/16 Time: 11:15						
Sample: 1/02/2012 12/31/2015						
Included observations: 967						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-36009.3	NA	7.61E+29	74.48054	74.49062	74.48438
1	-35175.5	1662.482	1.37E+29	72.76424	72.79449	72.77576
2	-35113.5	123.3737	1.21E+29	72.64427	72.69468*	72.66346
3	-35101.6	23.63983	1.19E+29	72.62792	72.69849	72.65478
4	-35093.3	16.53313	1.18e+29*	**72.61893***	72.70966	72.65347*
5	-35090.8	4.887544	1.19E+29	72.62209	72.73299	72.66431
6	-35089.2	3.08632	1.19E+29	72.62713	72.75819	72.67702
7	-35086.6	5.214553	1.20E+29	72.62993	72.78114	72.68749
8	-35079.2	14.47010*	1.19E+29	72.62297	72.79435	72.68821
* indicates lag order selected by the criterion						
LR: sequential modified LR test statistic (each test at 5% level)						
FPE: Final prediction error						
AIC: Akaike information criterion						
SC: Schwarz information criterion						
HQ: Hannan-Quinn information criterion						

System identified the following model of VAR with right lag length of 4 i.e. "S" (see table III.A) using Akaike information criteria (AIC). Thus well specified VAR for "S" no of lags is written as:

CASHVOLUME = C(1)*CASHVOLUME(-1) + C(2)*CASHVOLUME(-2) + C(3)*CASHVOLUME(-3) + C(4)*CASHVOLUME(-4) + C(5)*FOVOLUME(-1) + C(6)*FOVOLUME(-2) + C(7)*FOVOLUME(-3) + C(8)*FOVOLUME(-4) + C(9)

FOVOLUME = C(10)*CASHVOLUME(-1) + C(11)*CASHVOLUME(-2) + C(12)*CASHVOLUME(-3) + C(13)*CASHVOLUME(-4) + C(14)*FOVOLUME(-1) + C(15)*FOVOLUME(-2) + C(16)*FOVOLUME(-3) + C(17)*FOVOLUME(-4) + C(18)

After making adjustment for lag length of VAR system using Toda-Yamamoto method, the augmented VAR system can be specified for lag length of S+M i.e. 4+1=5 lags and estimated as follows

CASHVOLUME = C(1)*CASHVOLUME(-1) + C(2)*CASHVOLUME(-2) + C(3)*CASHVOLUME(-3) + C(4)*CASHVOLUME(-4) + C(5)*FOVOLUME(-1) + C(6)*FOVOLUME(-2) + C(7)*FOVOLUME(-3) + C(8)*FOVOLUME(-4) + C(9)+ ***C(10)*CASHVOLUME(-5)+ C(11)*FOVOLUME(-5)***……Equation(1)

FOVOLUME = C(10)*CASHVOLUME(-1) + C(11)*CASHVOLUME(-2) + C(12)*CASHVOLUME(-3) + C(13)*CASHVOLUME(-4) + C(14)*FOVOLUME(-1) + C(15)*FOVOLUME(-2) + C(16)*FOVOLUME(-3) + C(17)*FOVOLUME(-4) + C(18)+***C(19)*FOVOLUME(-5)+ C(20)*CASHVOLUME(-5)***……Equation(2)

TABLE III.B: TESTING FOR GRANGER NON CAUSALITY FROM FO VOLUMES TO CASH VOLUMES

Dependent Variable: CASHVOLUME				
Method: Least Squares (Gauss-Newton / Marquardt steps)				
Sample (adjusted): 1/09/2012 12/31/2015				
Included observations: 974 after adjustments				
CASHVOLUME = C(1)*CASHVOLUME(-1) + C(2)*CASHVOLUME(-2) + C(3)				
*CASHVOLUME(-3) + C(4)*CASHVOLUME(-4) + C(5)*FOVOLUME(-1) +				
C(6)*FOVOLUME(-2) + C(7)*FOVOLUME(-3) + C(8)*FOVOLUME(-4) +				
C(9)+ C(10)*CASHVOLUME(-5)+ C(11)*FOVOLUME(-5)				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.494176	0.035115	14.07316	0
C(2)	0.185269	0.041696	4.443349	0
C(3)	0.088699	0.042006	2.111582	0.035
C(4)	0.061027	0.041646	1.465371	0.1431
C(5)	6.373884	1.852766	3.440198	0.0006
C(6)	-6.36583	2.187314	-2.910341	0.0037
C(7)	-1.83757	2.207109	-0.83257	0.4053
C(8)	3.559741	2.184066	1.629869	0.1035
C(9)	90886354	18042872	5.037244	0
C(10)	0.040855	0.035748	1.142871	0.2534
C(11)	-0.01424	1.819885	-0.007825	0.9938
R-squared	0.646644	Mean dependent var		7.80E+08
Adjusted R-squared	0.642974	S.D. dependent var		2.33E+08
S.E. of regression	1.39E+08	Akaike info criterion		40.35604
Sum squared resid	1.87E+19	Schwarz criterion		40.41117
Log likelihood	-19642.4	Hannan-Quinn criter.		40.37702
F-statistic	176.2295	Durbin-Watson stat		1.994028
Prob(F-statistic)	0			

TABLE III.B1: WALD TEST FOR COEFFICIENTS FROM GRANGER EQUATION-1

Wald Test:			
Equation: Untitled			
Test Statistic	Value	Df	Probability
F-statistic	4.161715	(4, 963)	***0.0024***
Chi-square	16.64686	4	0.0023
Null Hypothesis: C(5)=C(6)=C(7)=C(8)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
C(5)		6.373884	1.852766
C(6)		-6.36583	2.187314
C(7)		-1.83757	2.207109
C(8)		3.559741	2.184066
Restrictions are linear in coefficients.			

Table III.B1 shows that WALD test statistic for c(5)=c(6)=c(7)=c(8)=0 significant and rejects the null hypothesis of non-causality from FO market to CASH market confirming that the lag values of FO volumes has combine effect on cash volumes confirming the granger causality from FO market volumes to CASH market volumes.

TABLE III.C: TESTING FOR GRANGER NON CAUSALITY FROM CASH VOLUMES TO FO VOLUMES

Dependent Variable: FOVOLUME				
Method: Least Squares (Gauss-Newton / Marquardt steps)				
Sample (adjusted): 1/09/2012 12/31/2015				
Included observations: 973 after adjustments				
FOVOLUME = C(10)*CASHVOLUME(-1) + C(11)*CASHVOLUME(-2) + C(12)				
*CASHVOLUME(-3) + C(13)*CASHVOLUME(-4) + C(14)*FOVOLUME(				
-1) + C(15)*FOVOLUME(-2) + C(16)*FOVOLUME(-3) + C(17)				
*FOVOLUME(-4) + C(18)+C(19)*FOVOLUME(-5)+ C(20)				
*CASHVOLUME(-5)				
	Coefficient	Std. Error	t-Statistic	Prob.
C(10)	-0.005106	0.00067	-7.623594	0
C(11)	0.002549	0.000795	3.205907	0.0014
C(12)	0.000677	0.000801	0.844515	0.3986
C(13)	0.001154	0.000794	1.45314	0.1465
C(14)	0.667981	0.035335	18.90436	0
C(15)	0.083086	0.041715	1.991748	0.0467
C(16)	0.045288	0.042093	1.075907	0.2822
C(17)	-0.031146	0.041653	-0.747758	0.4548
C(18)	1342247	344152.9	3.900148	0.0001
C(19)	0.046979	0.034709	1.353501	0.1762
C(20)	0.000568	0.000682	0.833445	0.4048
aR-squared	0.546603	Mean dependent var		6411493
Adjusted R-squared	0.54189	S.D. dependent var		3930276
S.E. of regression	2660161	Akaike info criterion		32.43691
Sum squared resid	6.81E+15	Schwarz criterion		32.49209
Log likelihood	-15769.56	Hannan-Quinn criter.		32.45791
F-statistic	115.9762	Durbin-Watson stat		1.986597
Prob(F-statistic)	0			

TABLE III.C1: WALD TEST FOR COEFFICIENTS FROM GRANGER EQUATION-II

Wald Test:			
Equation: Untitled			
Test Statistic	Value	df	Probability
F-statistic	14.86348	(4, 962)	0
Chi-square	59.4539	4	0
Null Hypothesis: C(10)=C(11)=C(12)=C(13)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
C(10)		-0.00511	0.00067
C(11)		0.002549	0.000795
C(12)		0.000677	0.000801
C(13)		0.001154	0.000794
Restrictions are linear in coefficients.			

Further table III.C1 show that WALD test statistic for c(10)=c(11)=c(12)=c(13)=0 significant and rejects the null hypothesis of non-causality from CASH market to FO market confirming that the lag values of CASH volumes has combine effect on FO volumes. From the above analysis it is concluded that bi-directional causality exist and both markets are co integrated in long run and cause one each other within the day trade significantly.

REFERENCES

1. Clarke, J. A. and S. Mirza (2006), "A comparison of some common methods for detecting Granger noncausality", Journal of Statistical Computation and Simulation, 76, 207-231.
2. Ghosh, A. (1993), "Hedging with stock index futures: Estimation and forecasting with error correction model", Journal of Futures Markets, 13, 743-752.
3. Granger, C. W. J., 1979, "Seasonality: Causation, interpretation, and implications. (With discussion.)", In A. Zellner (ed.), Seasonal Analysis of Economic Time Series. NBER, Washington DC, 33-56.
4. Karmakar, M. (2009), "Price discoveries and volatility spillovers in S & P CNX nifty futures and its underlying index CNX nifty", *Vikalpa*, *34*(2), 41-55.
5. Kawaller, I. G., Koch, P. D., & Koch, T. W. (1987), "The temporal price relationship between S&P 500 futures and the S&P 500 index", Journal of Finance, 1309-1329.
6. Mukherjee, K.N and Mishra, R.K. (2006), "Lead-Lag Relationship between Equities and Stock Index Futures Market and its Variation around Information Release: Empirical Evidence from India", *NSE Research Paper*, National Stock Exchange, India.
7. P. Srinivasan and K. Shyam Bhat (2009), "Spot and Futures Markets of Selected Commercial Banks in India: What Causes What?", International Research Journal of Finance and Economics, issue 31,28-40.
8. Raju, M. T. and Karande, K. (2003), "Price Discovery and Volatility on NSE Futures Market", *SEBI Bulletin*, 1(3), 5-15.
9. Sah, A. N. and Kumar, A. A. (2006), "Price Discovery in Cash and Futures Market: The Case of S&P Nifty and Nifty Futures", *The ICFAI Journal of Applied Finance*, 12(4), 55-63.
10. Toda, H. Y. and T. Yamamoto (1995), " Statistical inferences in vector autoregressions with possibly integrated processes", *Journal of Econometrics*, 66, 225-250.
11. Toda, H. Y., & Yamamoto, T. (1995), "Statistical inference in vector autoregressions with possibly integrated processes", Journal of econometrics, 66(1-2), 225-250.
12. Tse Y. K. (1995), "The Lead-lag relationship between spot index and futures price of the NIKKEI stock average", Journal of Forecasting, 14(7), 553-563.
13. Zapata, H. O. and A. N. Rambaldi (1997), " Monte Carlo evidence on cointegration and causation", Oxford Bulletin of Economics and Statistics, 59, 285-298.

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