Causality between Indian Futures and Cash Markets - Analysis with Granger Causality Block Exogenity Model

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ABSTRACT

In India, spot market return, number of contracts, turnover and volatility of the futures market are having short run relationship with futures market return. On the basis of the empirical analysis it is clearly found that spot market is the key factor that predicts the movement of futures market and the trader can depend upon volatility and trading volume to take any decision on futures market trading. In precise, spot market return, volatility of the futures market, turnover and number of contract are the determinants of the futures market in India. Spot market return is the major determinants of the futures market, indeed variables from futures market itself like open interest and turnover of futures market can be taken into consideration for determining the futures market return. The empirical study is made with spot return, futures return, volatility of futures return, number of contract, trading volume and open interest of S&P CNX Nifty and its underlying index Nifty -50 for the period 12th June 2000- 30th June 2011by applying the VAR Granger Causality/Block Exogeny Test.

Keywords: Cash Market, Futures Market, Causality, Granger Block Exogeny Model
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INTRODUCTION

The movement of the futures market can be predicted with the help of other factors from the futures market and spot market. Vipul (2008) makes an attempt to investigate the role of some variable from the futures market that can predict others. The relationship between variables like open interest, trading volume, turnover, volatility and futures return can be taken as variables to identify the relationship of the variables among themselves, then this relationship can be used to predict the movement of other variables. If some of the variables can predict the movement of another variable, it can be said that these are the determinant of that variable. The positive and contemporaneous relationship between price volatility and trading volume are found by Clerk (1973), Lawrence and Harris (1986) and these relationship can be quite effectively used for forecasting these variables with their past values (Vipul 2008). The very strong relationship between futures index trading and the liquidity of its underlying market shows that the trading of stock index futures enhances the liquidity of the underlying stocks (Tina. M. Galloway and Miller 1997). The role of arbitrage process in the index futures helps to increase the trading volume and its liquidity. Danthin (2003) and Edward (2006) argue that index related trading strategies like index arbitrage will increase liquidity. Trading between spot and futures market enhances the trading volume and liquidity of the index trading. Variables from the futures market can also be used as the element that may predict the movement of futures return. The relationship between different variables in the futures market reveals the ability of each variable to reflect the information flow to the market and its role in determining the futures markets movement. Information flow measured by trading volume has a positive relationship with volatility while market depth measured by open interest has an inverse relationship with volatility (Bessembinder and Seguin 1992, P. Sakthivel and B.Kamaiah 2009).

The importance of trading volume in the form of number of contracts or turn over can be traced from many studies in the literature. The level of flow of information to the market can be identified, and it may be used as the proxy for the liquidity of the market. Volatility and Trading volumes are interrelated which will provide a lot of information on the market movement. Trading volume is proxy for the flow of information into the market, trading volume and return volatility are driven by the same factors (Lastrapes 1990, P. Sakthivel 2009).

Literature proves the fact that those variables both from spot and futures markets play the role of passing information, and their relationship helps to provide one with another. Therefore to identify the role of each variable on the futures return and find the level of influence of each one to the futures return, the VAR

system is used. This model takes each variable as endogenous and exogenous simultaneously and finds the influence of each variable to another separately and together. This study makes an attempt to find the determinants of futures market return through the relationship between variables from the futures market and spot market. The literature finds that open interest, trading volume and volatility are playing their own role in the futures market (Julio 2008, Pratap Chandra Pati (2010), Gwilym et al (1999), Cambell et al (1993) Spyrou (2005) and Puja Padhi (2009). The interrelationship between futures return, spot return, open interest, turnover, number of contracts and futures market volatility are discussed by the study with the help of VAR Granger Causality/ Block Exogeny test. This study provides information on the causal relationship between these variables separately and together to find the determinants of the futures market in India. The second part of the study discusses the review of literature and finds the research gap. Methodology and data structure are explained in the third section. Empirical analysis and discussion are organized in the fourth stage and the last part contains the conclusion of the study.

Objectives of the Study

To find the significance of different determinants and their impact on Indian Futures Market.

REVIEW OF LITERATURE

The influence of trade volume and open interest, trade volume and volatility of futures and stock return are the important areas for research and empirically analyzes those areas may help the traders for predicting the market movement to make profit. Epaminontas Katsikas (2007), James Richard Cummings and Alex Frino (2008), Paul Dawson and Sotiris. K. Staikouras (2009), Pratap Chandra Pati and Prabina Rajib (2010), Jinliang Li (2010) make empirical analysis on cash trading, trading halt, mispricing and index futures price volatility with an aim to examine the effects of cash markets liquidity on the return volatility of stock index futures and the findings reveal that these variables are having influence on their spot market return.

The causal relationship of futures market on the spot market volatility is the core research area and many researchers like Anadrew W. Alford and James R. Boatsman (1995), Premalatha Shenbagaraman (2003), Claudio Albanese and Adel Osseiran (2007), Lech.A.Grzelak, Cornelis W Dosterlee and Sacha Van Weeren (2009) find the influence of futures return on the spot market volatility and also reveal that GARCH model is the best econometrics model to estimate the volatility of the markets.

The close relationship of trading volume, open interest and volatility is empirically analyzed by Stephen P.Ferris, Hun Y.Park and Kwangwoo Park (2002), Jian Yang, David A. Bessler and Hung-Gay Fung (2004), Hongyi Chen, Laurence Fung and Jim Wong (2005), Christos Floros (2007), Stephane. M. Yen and Ming. Hsiang Chen (2010), Julia. J. Lucia and Angel Pardo (2010) then find the close relationship between the open interest, volatility and trading volume.

The determinants and the influence of each variable in the Indian Futures market are analysed by M. Thenmozhi (2002), Sandeep Srivastave (2003), Kedar Nath Mukherjee and R.K. Mishra (2004) Ash Narayan Sah and G. Omkarnath (2005) Suchismita Bose (2007), Puja Padhi (2007) Vasilieios Kallinterakis and Shikha Khurana (2008), Vipul (2008), S.Bhaumik, M.Karanasos and A. Kartsaklas (2008), P.Sakthivel and B.Kamaiah (2009) Mayank Joshipura (2010). The results show the impact of open interest and trading volume in futures market on underlying cash market, the open interest based predictors are significant in predicting the spot price index in underlying cash markets in both the periods and any increase or decrease in mispricing are not lead to the major change in volatility, volume or open interest for any of the futures or the underlying shares.

On the basis of the literature, it is found that the determinants of the futures market are decided by many researchers in a different period by using different variables alone and various statistical tools in the same market. But taking the study period from 12th June 2000 to 30th June 2011 and considering many near month variables and by using one econometrics model is very essential to find the real role of each variable to predict the movement of other variables in the market. Checking the robustness of the result with different sub-period also increase the validity of the empirical results. This study fulfills the research gap by considering spot return, futures return, open interest, trade volume, futures return volatility and number of contract as variables, considering very long sample period, dividing the study period in the four sub-period on the basis of the real market movement and applying VAR Granger Causality/ Block Exogeny model.

DATA AND METHODOLOGY

In order to find the determinants of the futures market in India, this study considers variables like futures market return (FUT) as the representative of futures market, number of contract (CONT), turnover (TURN), open interest (OI), volatility of the futures return (VOL) and spot market return (SPOT). Futures return, open interest, number of contracts, turnover are taken from S&P CNX Nifty near month daily closing values and volatility series of futures return that is estimated through GARCH (1,1) methodology. Spot return is obtained from the closing index of the underlying value of Nifty -50 for the period 12th June 2000 to 30th June 2011. The whole study period is divided into development period (12th June 2000 to 28th February 2006), pre- financial crisis period (1st March 2006-14th January 2008), crisis period (15th January 2008 to 31st October 2008) and post-crisis period (1st November 2008 to 30th June 2011) for the separate analysis to check the robustness of the empirical results.

ECONOMETRICS MODELS USED IN THE STUDY

To check the properties of the time series data, the basic test like unit root test and the VAR model are applied. The existence of unit root is firstly tested using the ADF test in 1981 through the following relationship.

$$\Delta S_t = \alpha + \beta T + pS_{t-1} + \sum_{i=1}^{k} \gamma_i \Delta S_{t-1} + u_t \quad (1)$$

Then the stock prices follow a random walk. Phillip and Perron (1988) have modified the ADF test, with an assumption of using a non- parametric correction to allow for some serial correlation and heteroskedasticity.

$$y_t = \alpha_0 + a\, y_{t-1} + u_t \quad (2)$$

VAR Model

$$Y_t = C_0 + \sum_{k=1}^{p} A_k Y_{t-k} + \varepsilon_t \,,\ E(\varepsilon_t, \varepsilon_t^1) = \Omega$$

Where Y_{t-k} is a $nx1$ column vector of n stationary variables at time $t-k$, Co is a $nx1$ column vector of constants, A_k is an nXn matrix of coefficients, p is the number of lags, and ε_t is a $nx1$ column vector of white noise innovation terms with symmetric and positive definite variance- covariance matrix.

VAR is a systems regression model that can be considered a kind of hybrid between the univariate time series models and the simultaneous equation models. The simplest case that can be entertained is a bivariate VAR. Instead of having only two variables, y_{1t}, y_{2t} and y_{3t}.....y_{gt}, each of which has an equation. Another useful facet of VAR models is the compactness with which the notation can be expressed. This could be written as

$$y_{1t} = \beta_{10} + \beta_{11} y_{1y-1} + \alpha_{11} y_{2t-1} + u_{1t} \quad (3)$$

$$y_{2t} = \beta_{20} + \beta_{21} y_{2t-1} + \alpha_{21} y_{1t-1} + u_{2t} \quad (4)$$

Granger Causality Block Exogenity Test

One test of causality is whether the lags of one variable enter into the equation for another variable. If all variables in the VAR are stationary, the direct way to test Granger causality is to use a standard F-test of the restrictions:

$a_{21}(1)=a_{21}(2)=a_{21}(3) =....a_{21}(p)=0$ it is straight forward to generalize this notion to the n- variable. A block exogeny test is useful for detecting whether to incorporate an additional variable into a VAR. This multivariate generalization of the Granger causality test should be called a block- causality test. Estimate the y_t and z_t equations using lagged values of $\{y_t\}$,$\{z_t\}$ and $\{wt\}$and calculate $\sum_u$. re-estimate excluding the lagged values of $\{wt\}$ and $\sum_r$. find the likelihood ratio statistic:

$$(T-c)(\log|\Sigma_r| - \log|\Sigma_u|)$$

To address many lags issue tests are usually conducted that restrict all of the lags of a particular variable to zero. The VAR (3) could be written out to express the individual equation as-

$$y_{1t} = \alpha_{10} + \beta_{11} y_{1t-1} + \beta_{12} y_{2t-1} + \gamma_{11} y_{1t-2} + \gamma_{12} y_{2t-2} + \delta_{11} y_{1y-3} + \delta_{12} y_{2t-3} + u_{1t}$$

$$y_{2t} = \alpha_{20} + \beta_{21} y_{1t-1} + \beta_{22} y_{2t-1} + \gamma_{21} y_{1t-2} + \gamma_{22} y_{2t-2} + \delta_{21} y_{1t-3} + \gamma_{22} y_{2t-3} + u_{2t}$$

Assuming that all of the variables in the VAR are stationary.

ANALYSIS AND DISCUSSIONS

Summary Statistics

Table No.1 shows the summary statistics of variables included in the study for different periods. Nifty spot market return (SPOTR), Nifty futures market return (FUTR), futures market open interest (OI), number of contract (CONT), turn over (TURN) and volatility of futures market return series (VOL) are the variables included in the study. Summary statistics reveal that the mean, median and standard deviation of futures returns are positive, indicating that the investors are getting returns, and it is negatively skewed (-0.474) and peakedness of the distribution is revealed through kurtosis (12.009). Jarque Bera test value shows that the distribution is asymmetric and which is supported by the probability value presented. The same trend is observed in spot return during whole study period namely 12th June 2000 to 30th June 2011. Similar results of nonnormality are seen during the early stages of derivatives, the pre-crisis and post-crisis period. Though the nonnormality is seen in all study periods, during the financial crisis period, mean return from both futures and spot markets are negative. Other variables included in the study are open interest, number of contracts, turn over and volatility. All these variables have nonnormality distribution except turnover particularly during the financial crisis period.

The summary statistics of this study shows the asymmetric return in futures and spot market which is supported by the findings of the previous studies like, Fama (1965), Stevenson and Bear (1970), Kendull and Hill (1995) Chen (1996) Reddy (1997) Kamath et al. (1998) and Kapil Gupta et al. (2009). Findings of Karpoff (1987) also support the theoretical back- ground of this distribution in such a way that in the speculative derivative market, the volume of positive news is always higher than the volume of negative news because in the increasing market trend the speculators take every dip in the stock index as an opportunity to buy which may cause the speculative assets return behaving asymmetrically. The risk-averse nature of traders in a speculative asset may be a prominent reason for the asymmetric returns (Moolman, 2004). The volatility of the derivative market also may cause the distribution of spot and futures return in asymmetric. Diagler and Wiley (1999), find that high degree of volatility in speculative market, both optimistic and pessimistic views of traders to information causes expected variation in prices. Negatively skewed indices imply that futures market is in backwardation and offers significant arbitrage opportunities to traders (Vipul 2005).

Table 1: Summary Statistics of variables included in the study during different study periods

Period		SPOTR	FUTR	OI	CONT	TURN	VOLA
Whole study Period	Mean	0.000497	0.000495	15.79850	11.13658	12.06697	0.000313
	Median	0.001346	0.001001	16.65086	12.07817	13.22067	0.000186
	Std. Dev.	0.016610	0.017517	1.773199	2.477791	2.503864	0.000414
	Skewness	-0.30216	-0.47405	-1.29299	-1.14225	-1.1618	5.424452
	Kurtosis	11.08915	12.00970	3.956379	3.311294	3.179561	46.58532
	Jarque-Bera	7569.688	9441.874	874.5356	611.5433	624.8307	232082.6
	Probability	0.0000	0.0000	0.00000	0.00000	0.00000	0.00000
	Observations	2761	2761	2761	2761	2761	2761
Introduction & Development Period		**SPOTR**	**FUTR**	**OI**	**CONT**	**TURN**	**VOLA**
	Mean	0.000532	0.000528	14.62685	9.420625	10.36104	0.000205
	Median	0.00154	0.000892	14.77156	9.610089	10.30969	0.000146
	Std. Dev.	0.013968	0.01454	1.759516	2.333686	2.42131	0.00031
	Skewness	-0.97888	-1.34953	-0.65462	-0.58363	-0.46501	11.87132
	Kurtosis	10.85141	17.36221	2.922031	2.326301	2.072662	183.3275
	Jarque-Bera	3917.733	12777.88	102.9229	108.6795	103.2053	1979389
	Probability	0.00000	0.000000	0.00000	0.0000	0.00000	0.000000
	Observations	1436	1436	1436	1436	1436	1436
Pre-Financial Crisis Period		**SPOTR**	**FUTR**	**OI**	**CONT**	**TURN**	**VOLA**
	Mean	0.001449	0.001466	17.06729	12.71799	13.77355	0.000336
	Median	0.001748	0.001881	17.13378	12.71467	13.74109	0.000224
	Std. Dev.	0.016623	0.018205	0.334089	0.52048	0.389835	0.000307
	Skewness	-0.43501	-0.47119	-1.45286	0.025775	0.293951	2.754497
	Kurtosis	4.966837	5.082064	5.235554	2.361329	2.731321	12.4679
	Jarque-Bera	90.19481	101.8495	262.0973	8.005881	8.147443	2339.807
	Probability	0.00000	0.00000	0.00000	0.018262	0.017014	0.000000
	Observations	468	468	468	468	468	468
Financial Crisis Period		**SPOTR**	**FUTR**	**OI**	**CONT**	**TURN**	**VOLA**
	Mean	-0.0037	-0.00372	17.21106	13.3272	14.13067	1.50E-05
	Median	-0.00256	-0.00287	17.26727	13.34177	14.13609	-1.38E-05
	Std. Dev.	0.028212	0.029848	0.289433	0.293524	0.255578	0.00039
	Skewness	-0.39718	-0.40381	-1.40978	-0.45432	-1.30261	2.612852
	Kurtosis	5.015134	4.96376	4.903483	3.463756	10.31618	27.48799
	Jarque-Bera	37.92517	36.44462	93.54954	8.412244	487.5355	5068.005
	Probability	0.00000	0.00000	0.0000	0.014904	0.00000	0.00000
	Observations	194	194	194	194	194	194
Post Financial Crisis Period		**SPOTR**	**FUTR**	**OI 1**	**CONT**	**TURN**	**VOLA**
	Mean	0.000894	0.000883	17.02500	13.11341	13.97042	0.000303
	Median	0.001052	0.001148	17.05105	13.14181	13.97567	0.000169
	Std. Dev.	0.016411	0.017235	0.286016	0.352603	0.28431	0.000319
	Skewness	0.213191	0.154723	-1.33222	-0.16933	-0.06303	2.699379
	Kurtosis	6.045716	5.97132	5.620686	2.512979	2.919084	11.65878
	Jarque-Bera	258.5238	243.9364	382.9342	9.618021	0.613277	2845.973
	Probability	0.00000	0.00000	0.000000	0.008156	0.735916	0.00000
	Observations	656	656	656	656	656	656

Stationarity of Variables

Prior to further using econometrics models, there is a need to examine the stationarity of each time series as most data are non- stationary.

Table 2: Results of stationarity tests applied on variables included during the various study period

Periods	Variables	Level	
		ADF	PP
Whole study Period	Spotr	-12.45741**	-48.67637**
	Futr	-12.52330**	-51.13509**
	OI	-4.422677**	-6.836442**
	Cont	-3.000871**	-6.426959**
	Turn	-2.934808**	-5.695540**
	Vola	-7.885084**	-11.23244**
Introduction & Development period	Spotr	-17.02776***	-33.54328***
	Futr	-17.15609***	-35.67994***
	OI	-4.356221***	-8.606424***
	Cont	-1.954419	-13.14451
	Turn	-1.700198	-12.80008***
	Vola	-7.682694***	-8.240614***
Pre Financial Crisis Period	Spotr	-20.43867***	-20.41556***
	Futr	-22.18222***	-22.19149***
	OI	-3.740293**	-8.969928***
	Cont	-4.325047***	-8.887683***
	Turn	-5.333932***	-11.41222***
	Vola	-4.255502***	-4.049475***
Financial Crisis Period	Spotr	-8.592159***	-12.98812***
	Futr	-8.684351***	-13.54220***
	OI	-5.960647***	-5.780144***
	Cont	-3.213266**	-8.161439***
	Turn	-4.092526***	-8.492596***
	Vola	-14.53798***	-2.727447***
Post Financial Crisis Period	Spotr	-24.54234***	-24.55129***
	Futr	-25.22362***	-25.22639***
	OI	-2.175850	-10.73668***
	Cont	-6.833884***	-16.95903***
	Turn	-6.630251***	-17.33128***
	Vola	-6.380616***	-6.518180***

*** indicates the significance at 1% level, ** denotes 5% level of significance. AIC criterion is used to select lag length.

From Table 2, it is clear that variable used for the analysis are stationary in its level form, and both unit root tests such as ADF and PP test results confirm it. ADF and PP test do not give the same result on open interest during the post-financial crisis period and turn over in development-period. To get the same results from the both test, the study uses the two variables in their first difference form. Number of contract during development period is nonstationary in its level but to satisfy the objective of the study, these variables are transformed into their first difference.

VAR Lag Order Selection Criteria

VAR lag order selection criteria model is to be used to find the determinants of Indian futures market. It presents the lag selection criteria for different study periods. In the whole study period, the optimum lag length 5 is selected on the basis of Likelihood Ratio, Final Prediction Error, and Akaike Information Criterion. Same method is used to find the lag length for all other sub study periods and seen that lag length as 7 for the introduction and development period, 4 for pre-financial crisis, crisis and post-crisis periods.

Determinants of Futures Market in India

The casual relationship between Nifty spot and futures are examined by using VAR Granger Causality Block Exogeneity Test. This model considers each variable as endogenous and exogenous at its lagged form. The Chi-square (Wald) statistics is to test the significance of each variable and for the joint significance of variables like OI, TURN, CONT and VOL. VAR Granger Causality/Block Exogeneity Test result shows that during the whole study period, futures return is influenced by other all variables together, but not any one variable individually or separately. It is proved that Indian futures market is due to various factors collectively not any one independently.

Table 3: Results of VAR Granger Causality/Block Exogeneity Wald Tests for the variables included in the different study periods

Periods	Endogenous Variables	Lagged Exogenous Variables						
		SPOTR	FUTR	OI	CONT	TURN	VOLA	ALL
Whole Period	SPOTR		3.946798	5.062819	9.138260	7.531190	27.62769	27.62769
	FUTR	27.62769		3.718358	27.62769	27.62769	3.718358	48.23951***
	OI	23.46113***	19.54357***		6.916524	4.375829	6.252706	147.2533***
	CONT	15.37398***	15.29042***	54.84399***		5.650984	7.466012	123.6999***
	TURN	15.55372***	14.76765**	57.47863***	5.329932		57.47863***	116.6376***
	VOLA	69.42903***	69.42903***	5.126351	6.202335	6.008017		268.8997***
Development Period		**SPOTR**	**FUTR**	**OI**	**CONT 1**	**TURN 1**	**VOLA**	**ALL**
	SPOTR		9.564159	8.511414	3.887160	3.809448	12.15164*	47.70245*
	FUTR	39.59510***		8.489218	4.539439	4.437330	17.58610**	86.78087***
	OI	14.33259**	11.37550		0.895379	0.971433	11.78555	55.88637**
	CONT 1	22.62741	18.84775	16.55575		18.84775	9.750158	68.93215***
	TURN 1	22.21514***	18.49767***	17.35188**	6.414408		9.660333	68.91242***
	VOLA	67.33719	148.5628	6.200235	2.483155	2.397656		504.7862
Pre Financial		**SPOTR**	**FUTR**	**OI**	**CONT**	**TURN**	**VOLA**	**ALL**
	SPOTR		7.986068*	3.597548	9.786596**	8.265831*	4.410737	26.70021
	FUTR	10.00406**		1.869880	9.340128*	8.588159*	3.106387	27.17512

Crisis Period	OI	7.286120	7.505453		13.32188**	7.198444	3.270528	44.28424**
	CONT	4.381615	3.415340	21.12063***		12.72173**	5.603107	74.54318***
	TURN	5.427352	4.239972	24.17342***	4.258961		5.704711	62.58033***
	VOLA	24.13182***	29.32334***	1.436859	3.028416	9.156310*		170.7805***
Financial Crisis Period		**SPOTR**	**FUTR**	**OI**	**CONT**	**TURN**	**VOLA**	**ALL**
	SPOTR		5.528309	5.727444	5.109009	3.661564	2.264592	22.85483
	FUTR	4.000507		5.877795	4.704711	3.356324	1.664188	19.19652
	OI	0.569786	0.890682		1.464480	1.525481	3.850676	15.94917
	CONT	9.029903*	7.480348	3.845149		8.712995*	12.79380**	45.11890**
	TURN	9.512457**	7.847992*	4.542223	8.195858*		12.73443**	40.51196**
	VOLA	4.299809	3.949077	5.396989	16.20517**	16.79982**		70.69352***
Post Crisis Period		**SPOTR**	**FUTR**	**OI 1**	**CONT**	**TURN**	**VOLA**	**ALL**
	SPOTR		4.085726	6.607412	15.65948**	4.401452	20.41402***	36.83011**
	FUTR	1.858732		6.525279	15.57482**	4.480075	20.91203***	34.33012**
	OI 1	6.983390	6.447679		0.592564	1.370774	5.383494	24.62384
	CONT	4.529979	4.771670	7.840333*		9.006240*	3.633558	45.58888***
	TURN	4.409838	4.625764	8.183255*	2.947707		3.461715	22.93974
	VOLA	7.346100	5.196827	4.138302	15.96308**	3.102763		86.06244***

*,**,*** denotes the significance level at 10%, 5% and 1% respectively.
Chi-square value is placed in the table.

During the same period, it is also observed that spot market return is independent of variables considered in the study. No factor either individually or collectively inferences spot return. The table shows that all other variables like open interest, number of contracts, turnover and volatility in futures market are made to move by returns from spot and futures markets individually and also by all them together. Open interest plays a vital role, in addition to returns, on turnover and number of contracts. It is found that spot market impacts the futures returns and volatility also plays a role in determining the return of futures market, individually. It shows that during the initial period of introduction of derivatives in India, spot market has determined the futures return in addition to volatility with all other determinants together, which means that there was a need to observe the spot market movements to decide about the futures return. Return from spot market is determined by the volatility of futures return individually and all variables together. Chen et al (1995), Stephen. P. Ferris et al (2002) find significant dynamic interactions and causal relationship among volatility, open interest and trading volume.

As far as, derivatives market in India is concerned this is the period of development and maturity. During this period, the spot market is influenced by the futures market, number of contracts and turn over. Further futures market is having short term and causal relationship with spot return, number of contracts and turn over. Other variables are not influencing the futures return during the study period. From this result, it is clear that both spot and futures markets are influencing each other and it can be confirmed that there is bidirectional relationship between futures market and spot market that can be exploited by the arbitrageurs. Modest and Sundraresan (1983), Figlewski (1984) and Yadav and Pope (1994) find significant inconsistencies between spot prices and the futures prices for stock indices that can be exploited by arbitrageurs. During the pre-financial crisis period, spot return, number of contracts and turnover are considered as the determinants of futures market. All other variables together influence turnover. It is summarized that, futures market, as expected, is determined by one movement of spot market due to its maturity or growth, it is observed that instead of collective influence of variables, single factor started to determine the futures return in this period. The financial-crisis had created ripples in the whole financial system including stock market across the globe and India too had the effect of it through it had insulated itself. There had been sharp decline in the returns from stock market and therefore, an attempt is made to see what had happened in Indian derivatives market during this period, result shows very different relations between futures and its underlying market in India. During the period, all established relationships have disappeared, and each element is moving separately and independently which means that it is the period of speculators, and nobody can predict the movement of the Indian market. Speculators would involve in buying and selling shares in large scale when volatility is high. In order to predict the market and make more profit, no one plays a determinants role and only the proxies of trading volume like number of contracts and turn over are interlinked and volatility of futures market causes the contract volume and turnover in futures market. It indicates that trading volume is the strong indicator that can provide some information on any trend of the market. Trading volume is a significant explanatory variable (Gwilym et al 1999). Volatility is high during the bearish market, compared to the bullish market trend (Paul Dawson 2009). The present empirical results also project the role volatility and trading volume during the bearish market trend.

The crisis had distanced the spot and futures market, paving the way for speculators to have a field for short term benefits, without any factor determining the

dynamism of the markets. After this crisis, period, it is found that markets are linking towards closure but not close. One or all factors together started to determine the markets. Volatility individually along with all other variables determines the return of spot market and number of contracts and volatility individually along with other variables together determine the futures return.

During the post- financial crisis period, the short term relationship between all factors in the futures market and spot return are established, and the result is supported by the previous studies also. Futures lead the cash index return by responding more rapidly to economic events than stock prices. New market information may disseminate faster in the futures market compared to the stock market and futures volatility spill some information over to cash market (Puja Padhi 2009). It is seen that futures market is taking the lead position in the Indian market context. All other variables like number of contract, volatility series and other all variables of futures market can be taken as the determinants of the futures market in India. The level of influence of each variable to futures return should be different, and it is the duty of the player of the futures market to analyze the role of each variable and take the decision. However one thing is very clear that among these all variables, trading volume and volatility of futures markets are playing the vital role to determine futures market. Several price predictors have been developed from the open interest and trade volume of individual stocks from the futures market and explained that they exhibit significant explanatory and predictive power for the factors for the futures stock prices (Bhuyan and Yan 2002). From this empirical analysis, it is confirmed that all variables together determine the futures return during the whole study period. Due to the negative effect of the crisis, return from futures and spot market does not show causal relationship during the financial crisis period.

CONCLUSION

In Indian futures market, the spot market return, number of contracts, turnover and volatility of the futures market are having short run relationship with the futures market. On the basis of the empirical analysis it is confirmed that spot market is the key factor that predicts the movement of futures market and the trader can depend upon volatility and trading volume to take any decision on futures market trading. For the whole study period, it is found that all variables together are causing the futures market movement, and the relationship of each variable to futures market is to be taken into consideration. In the introduction and development stage, the spot market is individually influencing the futures market and all variable together is also having the causal relationship with Nifty futures market. In pre- financial crisis period, Nifty spot market, number of contract of Nifty futures market and turnover of the futures market are individually influencing Nifty futures market. In the financial crisis period, unfortunately, the established relationships are not at all seen. Inter relationships between all variables in the futures market are disappears. There is only one relationship that is the relationship between number of contract and turnover, but they do not have any causality with futures market during this crisis period. During post financial crisis period also all included factors have the relationship with the futures market and number of contract is having individual linkage with futures market. From this analysis, it is revealed that Nifty spot market return is the key indicator of Nifty futures market and other variables like futures market open interest, number of contract, turnover and volatility of futures market are to be considered as the determinants of futures market in India.

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