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Financial Crisis Effect on Cointegration of Indian Stock Market with Japan and UK

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Abstract:

Indian Stock market is highly dependent on FII especially during recent times. This study investigates on how Indian market was integrated with UK and Japan stock market prior and post 2007-08 financial crisis. For comparison purpose data is collected both on daily and weekly basis. The study supports daily data to be more informative. During the pre-crisis period both Japan and UK markets were integrated with Indian Market , while post crisis Indian market is influenced by UK stock market , but not by Japan market.

Keywords:

I. INTRODUCTION

Dalal Street has emerged as one of the fastest growing stock trading place making India as one of the favorite destination for financial institutional investors. This has happened due to stock market regulators providing, competitive transaction cost, continuous investor friendly transformation in financial market and strong policy framework . Inspite of which BSE was worst hit on 21st January 2008 when sensex had its biggest intraday fall due to global financial crisis " The sub-prime".

Shock of bust of credit bubble in United States originated in July 2007, when renowned financial institutions started collapsing due to housing prices falling below their mortgage loans resulting into increase in housing loan defaults. Inspite of government flooding bailout packages into the market, default and failure of other credit forms spread across the economy. The financial epidemic soon spread across the globe. Due to integrated interconnected and interknitted financial markets with high value and volume of international trade, almost all stock markets including India started reflecting dampening investment climate.

Studies on stock market integration is appealing to policymakers , investors and academicians because a integrated regional and international stock market is more efficient than a national financial market (George & Plummer, 2005). Transformation in market's has happened since Asian financial crisis of 1997, due to increased capital inflow from cross boarder investors in the form of foreign currency and reduced stake of domestic financial institutions has further increased the importance of research in this area. Stock liquidity has also reduced cost of raising funds for companies and transaction cost for various players in the market. But studies focused to Indian stock market (BSE) integrated with other international financial markets with strong currencies are very rare.

Following prominent researches done in applied finance, this study is to find, If Indian stock market was integrated to global markets prior and post 2007-08 crisis? If so, what was the extend of such cointegration? Which market was dominating(causal) other market's during this period. To answer these questions on co integrating relations Vector Auto regressive(VAR) , Vector Error Correction Model(VECM) and Granger causality test have been applied. Remaining paper has been organized as follows Section 2 gives a brief overview of literature on global market integration, Section 3 narrates methodology followed ADF test, Cointegration , VAR/VECM and Granger causality test ,section 4 provides empirical results and interpretation, Finally section 5 concludes.

II. REVIEW OF LITERATURE

2.1 Cointegration

(Grubel, 1968) was a pioneer in explaining the benefits to investors of international portfolio diversification. After which (Granger & Morgenstern, 1970) studied to determine relationship between various national exchanges using cointegration , after which numerous studies followed the same pattern. A cointegration hypothesis is useful to determine if there is any common factor determining the long run or short run movement between various financial markets or the market is driven by its own fundamentals. (Jeon & Furstenberg, 1990) used VAR and impulse response function analysis to observe co- movement of international stock prices after 1987 crisis , on the contrary (Koop, 1994) using Bayesian analysis concludes that there is no pairwise co-integration between international stock prices. (Chang, 2002) studies two Chinese stock markets (Shanghai and Shenzhen) and finds them not pairwise cointegrated so investors in Chinese stock markets can make abnormal profits in the long run. (Assidenou, 2011) based on one year daily stock prices from Sept 2008 of international stock prices of economies of OECD group ,Pacific group and Asian group observes atleast one co integrating vectors. Suggesting that during financial distress across the world ,there is no way investors and hedge there funds. (Sheng & Tu, 2000) has studied cointegration during pre and post Asian financial crisis of 1998 on 10 most stable Asian economies , US and Australia national stock index and establishes that there was no cointegration prior to financial crisis

but ,international stock prices cointegrated during the crisis period. (Wong, Agarwal, & Du, 2005) Indian stock market is integrated with matured stock markets . In the short run both US and Japan stock market granger cause Indian stock market but not vice-versa. (Masood, Bellalah, Chaudhary, Mansour, & Teulon, 2010) study co-integration and causal relationship between Baltic countries and found 2 co integration vectors , supporting good economic relationship and strong exchange rate between Baltic bench, Riga and Tallinn. (Gupta & Guidi, 2010) finds integration between India stock market and thee Asian markets(Japan , Singapore and Hongkong) and observe that correlation role very high during financial trouble period and came back to normal after crisis. (Nashier, 2015) did a study on integration between BRICS countries with US and UK and finds cointegration between stocks of Russia , South Africa and UK.

2.2 Type of data

(Cerny & Koblas, 2008) finds that during this age of technological advancement, information flows very fast among various markets using monthly data is arbitrary , to see if markets move together they recommend daily data. (Fraser & Oyefeso, 2008) collected monthly real stock prices which is done by using Consumer Price Index (CPI) as a deflator for stock price indices. While (Khan, 2011) uses daily data and since during his period of study not much exchange rate and inflationary fluctuations were observed so it is not used as deflator. (Hassan & Naka, 1996) recommend daily data as it captures information required to study short run and long run lead lag relationships. Long-run integration of markets, can be studied well if data is for a longer duration, instead of huge sample size with high frequency data (Hakkio & Rush, 1989).

2.3 Event studies

(Hassan & Naka, 1996) study shows that fluctuation in one international market has its immediate effect on other similar market. Prior and post 1987 crash US stock market lead other international markets in the short run but in the long run investors cannot take advantage of portfolio diversification. They find that Japan , UK and German markets are not co integrated. (Cha & Oh, 2000) used VAR on weekly data to study relationship between four Asian developing economies(Hong Kong, Singapore, Taiwan, and South Korea) and two global developed economies (US and Japan) and observes that open economies like Hong Kong and Singapore were led by US economy ,while Taiwan and Korea were influenced by Japanese index. The 1987 crisis did not change the lead nature of US stock market over developing Asian economies. (George & Plummer, 2005) finds ASEAN-5 countries are integrated post Asian financial crisis in all forms of data ie daily data, weekly data, also in all currencies forms namely local U S and Japanese.
Based on above literature it has been observed that cointegration of Indian stock market with developed Asian and global economies has not been explored much. Moreover very few studies are done to observe the impact of financial crisis of 2007, upon interdependence of Indian and global stock markets. Most of the studies are done using daily stock prices , this paper is a event study, to analyze how India stock market was integrated with Japan and UK market from 2000 to 2007 ie pre crisis period and from 2008 to 2015 as post crisis period. For robustness of the study , avoid serial correlation and common lag problem a comparative study is done using daily and weekly data (Raj & Dhal, 2008).

III. METHODOLOGY

3.1 Unit Root Test

The ADF test for each of the variables in X_t denoted by IND_t, JP_t and UK_t is estimated by the following regression equation:

$$\Delta X_t = \alpha + \rho X_{t-1} + \sum_{i=1}^{k} \beta \Delta X_{t-1} + e_t \qquad \text{..... (1)}$$

Where X_t is the set of variable under consideration, the order of k is set large enough to ensure that the residual series, e_t is a white noise process. The null hypothesis that X_t contains a unit root is rejected when the estimated co-efficient of the lagged variable is $-1 < \rho < 1$ for levels and $-2 < \rho < 0$ for the first difference (Enders, 1995).

3.2 Johansen Cointegration

When all the variables in X_t exhibit the same order of integration, (Johansen, 1988) and (Johansen & Juselius, 1990) multivariate cointegration method can be used to examine cointegrating relationship among the variables. (Johansen & Juselius, 1990) propose a maximum likelihood estimation approach for the estimation and evaluation of multiple cointegrated vectors. In this method two likelihood ratio tests are commonly used to determine the number of cointegrating vectors. These are namely the trace test and maximum Eigen value test. These tests can be used to test the null hypothesis of at most r cointegrating relationship among the variables in X_t. In order to apply the Johansen procedure, a lag length must be selected for the VAR. A lag length is selected on the basis of the Schwarz Information Criterion (SIC)

3.3 Vector Error Correction Model (VECM)

If there exist at least one cointegrating relationship among the variables in X_t then the causal relationship among these variables can be determined by estimating the Vector Error Correction Model (VECM). It simply assumes that a portion of the disequilibrium for a given period will be corrected in the subsequent period. According to the Granger Representation Theorem, Engle and Granger (1987), the concept of cointegration and Error Correction are equivalent. As such, if all the variables in X_t are found to be cointegrated then the relationship can be adequately represented by n VECM.

3.4 Granger causality test

The Granger causality test is used to demonstrate casual relationships between time series. (Granger C. , 1981) defines Granger causality as: "A time series variable X Granger causes Y, if the probability of Y conditional on its own past history and the past history of X does not equal the probability of Y conditional on its own past history alone." Using this concept, it is possible to assess whether X causes Y or vice-versa. The VAR can be considered as a means of conducting causality tests, or more specifically Granger causality tests. Granger causality implies a correlation between the current value of one variable and the past values of others; it does not mean changes in one variable cause changes in another. By using a F-test to jointly test for the significance of the lags on the explanatory variables, this in effect tests for 'Granger causality' between these variables.

According to the concept of Granger causality, 'X causes Y' if and only if the past values of X help to predict the changes of Y. While, 'Y causes X' if and only if the past values of Y help to predict the changes of X. The vector autoregression (VAR) model is to be used for this purpose.

IV. EMPIRICAL RESULTS AND INTERPRETATION

The test of stationality developed by Dickey and Fuller (1979) has been performed for the series.

Table 1: Augmented Dickey Fuller (ADF) Test Results for Stock Market Indices

Variables	**ADF Statistic (Daily)**	**ADF Statistic (Weekly)**	**ADF Statistic (Daily)**	**ADF Statistic (Weekly)**
Pre-Crisis Period (Level form with Intercept)			**Pre-Crisis Period (First Difference form with Intercept)**	
LIND	0.492010	0.734586	-36.81682*	-17.40176*
LJP	-1.921059	-1.768989	-40.89862*	-19.38003*
LUK	-1.513740	-1.387575	-42.33961*	-18.62570*
Post-Crisis Period (Level form with Intercept)			**Post-Crisis Period (First Difference form with Intercept)**	
LIND	-0.745938	-0.636191	-38.67467*	-11.02127*
LJP	-0.635608	-0.651604	-41.11866*	-21.56273*
LUK	-1.806642	-1.447600	-31.32681*	-21.64575*
Notes: * – indicates significance at one per cent level. Optimal lag length is determined by the Schwarz Information Criterion (SIC).				

ADF test is conducted to test the unit root for pre-and post-crisis daily and weekly stock indices of India, Japan and the United Kingdom and the results are presented in the Table-1.The ADF test reveals that daily and weekly stock indices of India, Japan and the United Kingdom for both pre-and post-crisis period are found to be non-stationary at their levels and stationary at their first difference. This implies that the unit root test for daily and weekly stock prices of individual markets during pre-and post-crisis period rejected the null hypothesis of unit root at their first difference, hence the stock price series of respective markets are found to be stationary and they are integrated in the same order, I(0).

Since all the variables are integrated of order one, application of Johansen Cointegration test is more appropriate (Johansen, 1995) . Johansen Cointegration test is sensitive to the lag length and therefore an optimal lag length (p) must be chosen. Different information criteria were computed for different time lags; each at five percent level of Likelihood Ratio (LR), Final Predict Error (FPE), Akaike Information Criteria (AIC), Schwarz Information Criteria (SC), and Hannan-Quinn information criteria (HQ). The results of the lag length criterion are presented in Table 2. Using Monte Carlo simulations, (Cheung & Lai, 1993) show that for autoregressive process standard selection criteria, like the Schwartz Information Criterion (SIC) and Akaike Information Criterion (AIC), can be useful for selecting the correct lag structure for the Johansen's cointegration test. They found that the SIC performs slightly well than the AIC does. In the present study, the Schwartz Information Criterion (SIC) was used to select the number of lags required in the cointegration test. As per the SIC, the appropriate lag for daily data during pre-and post crisis period is two. And it is found to be one for weekly data during pre-and post crisis period. Hence, the number of lags required in the Cointegration test was set to two and one for daily and weekly dataset, respectively.

Table 2: Selection of VAR Lag-Length Criteria

Daily Data (Pre-Crisis Period)							**Daily Data (Post-Crisis Period)**						
Lag	LogL	LR	FPE	AIC	SC	HQ	Lag	LogL	LR	FPE	AIC	SC	HQ
0	5910.728	NA	1.46e-07	-7.226579	-7.216672	-7.222904	0	6672.609	NA	4.68e-08	-8.363146	-8.353037	-8.359391
1	18356.98	24831.60	3.60e-14	-22.44034	-22.40071	-22.42564	1	17491.55	21583.63	6.08e-14	-21.91794	-21.87750	-21.90292
2	18428.48	142.4019	3.34e-14	-22.51680	-22.44745*	-22.49108*	2	17668.90	353.1292	4.92e-14	-22.12902	-22.05826*	-22.10274
3	18443.16	29.17489	3.32e-14*	-22.52374*	-22.42467	-22.48700	3	17692.58	47.06084	4.83e-14	-22.14743	-22.04634	-22.10989*
4	18450.92	15.39217	3.32e-14	-22.52223	-22.39343	-22.47445	4	17702.48	19.64980	4.83e-14	-22.14857	-22.01715	-22.09976
5	18459.54	17.07323*	3.32e-14	-22.52176	-22.36325	-22.46296	5	17708.72	12.35243	4.84e-14	-22.14510	-21.98336	-22.08503
6	18466.17	13.11362	3.33e-14	-22.51887	-22.33063	-22.44904	6	17717.51	17.36073	4.84e-14	-22.14483	-21.95276	-22.07350
7	18470.44	8.410264	3.35e-14	-22.51307	-22.29511	-22.43223	7	17727.17	19.06046	4.84e-14	-22.14567	-21.92327	-22.06307
8	18473.02	5.095537	3.38e-14	-22.50523	-22.25755	-22.41336	8	17748.43	41.84936*	4.77e-14*	-22.16104*	-21.90831	-22.06718

Weekly Data (Pre-Crisis Period)							Weekly Data (Post-Crisis Period)						
Lag	LogL	LR	FPE	AIC	SC	HQ	Lag	LogL	LR	FPE	AIC	SC	HQ
0	1328.884	NA	1.19e-07	-7.427924	-7.395338	-7.414963	0	1502.492	NA	4.62e-08	-8.377051	-8.344532	-8.364118
1	3360.957	4018.609	1.43e-12	-18.76166	-18.63132*	-18.70982*	1	3272.491	3500.445	2.47e-12	-18.21503	-18.08496*	-18.16330
2	3372.183	22.01128*	1.41e-12*	-18.77413*	-18.54603	-18.68341	2	3292.625	39.48069	2.32e-12	-18.27724	-18.04961	-18.18671
3	3378.145	11.59059	1.43e-12	-18.75711	-18.43125	-18.62751	3	3308.976	31.78736	2.22e-12	-18.31830	-17.99312	-18.18897*
4	3385.977	15.09308	1.44e-12	-18.75057	-18.32695	-18.58208	4	3315.656	12.87493	2.25e-12	-18.30534	-17.88260	-18.13721
5	3389.200	6.158473	1.49e-12	-18.71821	-18.19683	-18.51084	5	3335.198	37.33759	2.12e-12	-18.36423	-17.84394	-18.15731
6	3394.070	9.221377	1.53e-12	-18.69507	-18.07594	-18.44882	6	3344.831	18.24372*	2.12e-12*	-18.36777*	-17.74992	-18.12205
7	3402.465	15.75524	1.53e-12	-18.69168	-17.97479	-18.40654	7	3353.162	15.63802	2.13e-12	-18.36403	-17.64863	-18.07952
8	3409.280	12.67425	1.55e-12	-18.67944	-17.86479	-18.35542	8	3359.964	12.65415	2.15e-12	-18.35175	-17.53879	-18.02844

Notes: * 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.

Table 3: Johansen's Cointegration Test Results

Vector (r)		**Trace Statistics (λ_{trace})**	**Critical Value at 5% Percent**	**Max-Eigen Statistics (λ_{max})**	**Critical Value at 5% Percent**
Pre-Crisis Period (Daily)					
H_0: r = 0	H_1: r = 1	37.87210**	29.79707	31.18691**	21.13162
H_0: r = 1	H_1: r = 2	6.685197	15.49471	6.544007	14.26460
H_0: r = 2	H_1: r = 3	0.141190	3.841466	0.141190	3.841466
Post-Crisis Period (Daily)					
H_0: r = 0	H_1: r = 1	18.88770	29.79707	12.46167	21.13162
H_0: r = 1	H_1: r = 2	6.426024	15.49471	6.325053	14.26460
H_0: r = 2	H_1: r = 3	0.100970	3.841466	0.100970	3.841466
Pre-Crisis Period (Weekly)					
H_0: r = 0	H_1: r = 1	40.19134**	29.79707	32.62868**	21.13162
H_0: r = 1	H_1: r = 2	7.562652	15.49471	7.023081	14.26460
H_0: r = 2	H_1: r = 3	0.539571	3.841466	0.539571	3.841466
Post-Crisis Period (Weekly)					
H_0: r = 0	H_1: r = 1	19.90949	29.79707	13.05921	21.13162
H_0: r = 1	H_1: r = 2	6.850275	15.49471	6.849800	14.26460
H_0: r = 2	H_1: r = 3	0.000475	3.841466	0.000475	3.841466

Notes: **- denote the significance at the five per cent level. r is the number of cointegrating vectors under the null hypothesis (Ho) and H1 represents the alternative hypothesis.

As (Engle & Granger, 1987) pointed out, it is possible that a linear combination of non-stationary series may be stationary. If such stationary combination exists, the non-stationary time series are said to be co-integrated and it is then possible to interpret it as a long-run equilibrium relationship among the variables. (Johansen, 1995) suggested two test statistics based on Likelihood ratio (LR); the trace statistics and the Maximum Eigen value statistic. The first statistic tests the null hypothesis that the number of Cointegration vector is less than or equal to *r* against the alternative that the number of Cointegration vector is equal to *r*. The second statistic tests the null hypotheses that the number of Cointegration vector is equal to *r* against the alternative that it is equal to *r+1*. The results of cointegration tests of (Johansen, 1988) have been performed between India, the UK and Japan markets to examine the long-run relationship between them and the results are presented in Table 3. The table results indicate the existence of one cointegration relationship between India, the UK and Japan markets for the daily and weekly pre-crisis period. Johansen's max and trace statistic reveal the selected markets stand in a long-run relationship between them, thus justifying the use of a Vector Error Correction Model (VECM) for showing short run dynamics. However, the results indicate the absence of long-run relationship between India, the UK and Japan markets for the daily and weekly post-crisis period. If there is no cointegration between the variables, then the Granger Causality test should be carried out in differenced data. Thus Granger Causality test is employed to examine the causal nexus between markets for the daily and weekly post-crisis period.

Table 4: Cointegration of Stock Market Indices

Variables	**Daily Data (Pre-Crisis Period)**	**Weekly Data (Pre-Crisis Period)**
LIND	1.00000	1.00000
LJP	5.138386 (6.98226)*	5.167304 (7.51629)*
LUK	-4.667067 (-4.66240)*	-4.641633 (4.93696)*
Note: *- denote the significance at the one per cent level.		

After ascertaining that at best a single cointegration relation among the denominated stock prices is supported, it is of interest to derive some useful perspectives from the sign condition and size of the coefficients in the long-run cointegration relation pertaining to stock price indices. Since our interest is in the Indian market vis-à-vis Japan and the UK markets, we present the cointegrating vector normalised to India's stock price (Table 4) using daily and weekly data for the pre-crisis periods. We found that the Japan has positive sign with Indian market, whereas the UK has the negative sign with the Indian market in the long-run. Second, in absolute terms, the coefficients of Japan market are substantially higher than those of the United Kingdom in the long-run.

The VECM result using daily and weekly data for the pre-crisis periods have been presented in Table-5. The empirical results for the pre-crisis period based on daily data show that there is causality from Indian market to Japanese market. The results also indicate that the bidirectional causality between the UK and Indian markets, and the UK and Japan markets.

Moreover, the result of pre-crisis period based on weekly data show the causality exists from Japan to the UK market. And the Indian market not influences the other markets during this sample period

Table 5: Vector Error Correction Model for Stock Market Integration (Pre-Crisis Period)

Parameter	**Daily Data (Pre-Crisis Period)**			**Weekly Data(Pre-Crisis Period)**		
	ΔIND_t	ΔJP_t	ΔUK_t	ΔIND_t	ΔJP_t	ΔUK_t
ECT	-0.342149 (0.02773) [-12.3374]*	-0.089488 (0.02599) [-3.44268]*	0.354102 (0.02020) [17.5282]*	2.08E-05 (0.00209) [0.00996]	-0.005659 (0.00181) [-3.12972] *	0.013562 (0.00123) [11.0659] *
ΔIND_{t-1}	-0.351089 (0.02884) [-12.1750]*	0.094006 (0.02703) [3.47800]*	-0.246910 (0.02101) [-11.7541]*	-0.510228 (0.05086) [-10.0330]*	0.013839 (0.04404) [0.31424]	0.009412 (0.02985) [0.31533]
ΔIND_{t-2}	-0.218993 (0.02499) [-8.76455]*	-0.001932 (0.02342) [-0.08248]	-0.134791 (0.01820) [-7.40565]*	-----	-----	-----
ΔJP_{t-1}	0.036798 (0.02645) [1.39111]	-0.718959 (0.02479) [-28.9978]*	-0.068439 (0.01927) [-3.55175]*	-0.015001 (0.06018) [-0.24927]	-0.492221 (0.05212) [-9.44459]*	-0.202237 (0.03532) [-5.72565]*
ΔJP_{t-2}	-0.016824 (0.02568) [-0.65514]	-0.346025 (0.02407) [-14.3760]*	-0.058111 (0.01871) [-3.10649]*	-----	-----	-----
ΔUK_{t-1}	-0.491049 (0.05601) [-8.76666]*	0.119055 (0.05250) [2.26767] **	-0.056926 (0.04080) [-1.39514]	0.151180 (0.10824) [1.39669]	0.034408 (0.09374) [0.36706]	0.084988 (0.06353) [1.33774]
ΔUK_{t-2}	-0.222071 (0.03864) [-5.74692] *	0.068496 (0.03622) [1.89117] ***	-0.032345 (0.02815) [-1.14909]	-----	-----	-----
c	6.24E-06 (0.00018) [0.03382]	-4.48E-07 (0.00017) [-0.00259]	6.04E-06 (0.00013) [0.04499]	2.68E-05 (0.00089) [0.03018]	-1.11E-06 (0.00077) [-0.00144]	7.39E-05 (0.00052) [0.14192]

Notes: Optimal lag length is determined by the Schwarz Information Criterion (SIC), F_t and S_t are the Futures and Spot market prices respectively, *, ** and *** denote the significance at the one, five and ten per cent level, respectively. [ ] - Parenthesis shows t-statistics, * ,**(***) – indicates significance at one, five and ten per cent level, respectively. ( ) - Parenthesis shows standard error.

Table 6: Granger Causality Test for Stock Market Integration (Post-Crisis Period)

Pair-wise Granger Causality Test- Daily Data (Post-Crisis Period)		
Null Hypothesis	**F-Statistic**	**Probability**
JP does not Granger Cause IND	0.37674	0.68615
IND does not Granger Cause JP	39.8617*	0.00000
UK does not Granger Cause IND	16.5297*	0.00000
IND does not Granger Cause UK	5.83470*	0.00299
UK does not Granger Cause JP	135.910*	0.00000
JP does not Granger Cause UK	1.21424	0.29721
Pairwise Granger Causality Test- Weekly Data (Post-Crisis Period)		
JP does not Granger Cause IND	3.82451**	0.04928
IND does not Granger Cause JP	9.09116*	0.00275
UK does not Granger Cause IND	0.54753	0.45981
IND does not Granger Cause UK	2.45747	0.11784

UK does not Granger Cause JP	2.04180	0.15389
JP does not Granger Cause UK	0.06801	0.79440
Notes: *(**)- denote the significance at the one and five per cent level, respectively.		

The Granger Causality test result using daily and weekly data for the post crisis periods have been presented in Table-6. The results based on post-crisis daily data indicate that we can reject the null hypothesis that the UK does not Granger causes Indian market, and vice versa (both at the 1% level of significance). So the bidirectional relationship exists between the UK and the Indian stock market. Further the analysis shows that the Indian market influences the Japan market. And the Japan market is also influenced by the UK stock market during this sample period.
With regards to the relationship between these markets during the post-crisis weekly data, the analysis shows that we reject the null hypothesis that India do not Granger cause Japan, and vice versa, indicating that there is feedback relationship between the Indian and Japanese stock markets. And there is no significant evidence exists between Indian and the UK stock market.

V. CONCLUSION

The results indicate a bidirectional causal relationship between Indian stock market and UK stock market daily prices before as well as after 2007 financial crisis. This relationship is supported by the fact that India has always shared good business relationships with United Kingdom. Also many Indian companies are listed on FTSE. Before the financial crisis daily data indicates that there was a causality from Indian stock market to Japan stock market, but post financial crisis there was no relation between Indian and Japanese market suggesting that Asian market are sensitive to global event rather than regional markets. Study also observes that UK market has caused Japan market pre and post financial crisis according to daily data study , but only during pre-crisis period Japan caused a fluctuation in UK financial market, post crisis UK stock market had no correlation with Japan market. Financial crisis has not just given a monetary setback to countries but has also changed international financial relationships among them.

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