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AN EMPIRICAL INVESTIGATION OF CO-INTEGRATION BETWEEN SENSEX AND THE SELECTED WORLD STOCK MARKETS

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ABSTRACT
This study investigates the stock market integration amongst important global stock markets, namely, China, Japan, India, European Union, UK and USA for the period of 5 years between April 2013 and May 2018.The main objective for the present study is to test the co-integration of the major foreign stock markets and to find out the causal relationship among major selected stock markets and to assess the Interdependence of foreign stock markets and their impact on Indian stock exchange.Descriptive statistics reveals that BSE-Sensex is the quite uncertain market with high level of market return amongst all the developed stock markets as their standard deviation is higher. From the study it is found that there is a long run influence of world stock market on Indian stock market. Granger causality reveals that Indian stock market does not granger cause other stock exchanges and vice-versa.

Keywords: SENSEX, Multiple regressions, JB Test. Granger causality.

I. INTRODUCTION

The stock exchanges where the stocks are listed and traded arethe entities specialized in the business of bringing buyers andsellers of stocks and securities together. The buyers and sellersof stocks are none other than the participants of the stock market. The world's key stock exchanges share a common threat and opportunity: globalization. Free-flowing capital, Businesses without borders and new Economic Growth Centers create an environment of intensified global competition among the world's stock exchanges. Financial markets, and especially stock markets, have grownconsiderably in developed and developing countries over thelast few decades. Better fundamentals, structural, and specific policychanges have aided in their growth.Global equity markets posted another positive year of returns in 2017-18 poised for a downturn. Indian capital market continued to rise in 2017-18 on the back of government initiatives, ratings upgrades and optimism in global markets.

II. REVIEW OF LITERATURE

A group of studies prevalent, which emphasized that integration between Indian economy and other major Global economies, has increased with the passage of time.

Swetadri Samadder & Amalendu Bhunia (2018) examines investigate the short-term and long-term connexion amid the Indian stock market and the established stock markets namely, Australia, Canada, France, Germany, India, UK and USA. It shows that there is Low correlation between Indian and France stock market that indicates the possible gains from international diversifications. Granger causality test results based on VECM show that both Indian stock market and USA stock market are associated in the long-run and Indian stock market is associated with France. Germany and USA stock markets in the short-run[1].Yaman and Bhunia (2017) investigated whether there is any causal relationship between Asian stock markets and US stock market based on daily stock price indices between January 1991 and March 2016 using unit root test, VECM and co-integration analysis. They confirmed that there is a positive association between the latter and most of the Asian stock markets in our sample. An exception is the Vietnamese stock market, which has a negative correlation with the US market, indicating opportunities for diversification by investors[2]. Prof. Patel (2017) has examined the Co-movement of the 14 selected stock markets and have also tried to exploring the short and long-term relationship between 14 stock exchangesviz, BSE Sensex, HangSeng, MXX, FTSE-100, Nikki, NASDAQ, JKSE, BVSP, KSE, KSE- Korea stock exchange, RTS, SSE, SSMI and TSEC.Result of Granger Causality Test indicates that the return of BSE is depending on BVSP, FTSE-100 & MXX only. BVSP depends only on BSE, FTSE-100, Hang Seng and KSE only.The analysis of dependency can help in taking the investment in a better way[3]. Dr.Nisha Jindal, Prof. RavinderVinayek&Dr. Ravi Kumar Gupta (2016) have investigated how the emerging economies and developed economies are integrated with each other. In this study they have stated that the stock markets of developed economies of Australia, Hong Kong, Germany, USA, Japan and Singapore have a causal relationship with Indian stock market but Indian stock market does not have much influence on the stock markets of any developed economy. Although they also infer that there is no stable lead-lag relationship of Indian stock market with the stock markets of developed and emerging economies[4].Dr.Neetu Jain, (2016) analysed the linkages among the BRICS stock markets – Brazil, Russia, India, China and South Africa. The

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results show that there is no long run association between Nifty and rest of the Stock exchanges; further, t Indian Stock market is not caused by the BRICS market. The results and the outcomes can be used to ma analysis for better investment and speculative purposes[5].

III. RESEARCH METHODOLOGY

- **Type of Research:** Descriptive research used for the study, with the characteristics of prices or index valu of selected foreign and Indian indices.
- **Method of sampling:**Sampling technique followed is Convenience Sampling. Sample units chosen ar Indian Stock Market and 5 major global stock markets.
- **Sample Size:** The study covers 5 major foreign stock market and for a period of 5 years i.e., from Apr 2013 to March 2018.

Table-1: Ranks of global indices based on their market capitalization

Ranking	Stock Exchanges	Market Capitalization	Country
1	New York Stock Exchange (NYSE)	US$19.6 trillion	US
2	NASDAQ	$8.13 trillion	US
3	London Stock Exchange Group	$3.61 trillion	UK & Italy
4	Japan Exchange Group Inc.	$5.12 trillion	Japan
5	Shanghai Stock Exchange	$4.27 trillion	China
6	Hong Kong Stock Exchange	$3.37 trillion	China
7	Euronext	$3.49 trillion	European Union
8	Shenzhen Stock Exchange	$3.24 trillion	China
11	Bombay Stock Exchange	$1.66 trillion	India

Source: Stocks_To_Trade/Wiki_Stock_exchanges

- **Research Technique:** The following econometrics tools were used for analyzing the Co-integration betwee Indian Stock Market and Major Foreign Stock markets.

Table-2: Different research techniques used for the study

Sl. No	Statistic/Econometric Tools	Purpose
1	**Descriptive Statistics**	To describe the nature of data set.
2	**Jarque-Bera test**	To test whether stock indices of the various countries individually follow the normal probability distribution and Goodness of fit. (Normality Test)
3	**Unit Root Test: Augmented Dickey Fuller Test**	The selected data will be tested for the stationary.
4	**Multiple-Regression Analysis**	When there is more than single independent variable, the regression is termed as **multiple regression scrutiny,** used to check inter-dependency.
5	**Granger Causality Test**	To establish whether in the long runthe variables under study would move in the same direction or not.
6	**Co-Integration:**	This test is to be done to check whether there is a long term relationship exists, caused by BSE Sensex & selected global equity markets.
7	**Vector Error Correction Model (VECM)**	To integrate the multivariate time series data

IV. OBJECTIVES

- To find whether the major foreign stock markets and Indian Stock Market are integrated.
- To find out the causal relationship among major selected equity markets.
- To assess the Interdependence of foreign stock markets and their impact on Indian stock exchange.

V. SCOPE OF THE STUDY

The present study will help us to analyze the interdependence that exists between the 5 major foreign stock markets with special reference to India on the basis of 5 years Monthly prices of these indices. The dependency of each market to other markets can be studied which will help in taking the investment in a better way.

VI. EMPIRICAL RESULTS

Table-3: Descriptive Statistics

	SENSEX	ENX	LSE	NASDAQ	NIKKEI	SHANGHAI
Mean	26978.10	902.2632	2611.476	5120.428	17842.96	2925.179
Median	27005.52	882.9800	2547.000	4944.740	17489.07	3090.480
Maximum	35965.02	1068.230	4477.000	7442.120	23098.29	4611.740
Minimum	18619.72	703.8400	1231.600	3328.790	13388.86	1979.210
Std. Dev.	4423.665	94.59269	854.0140	1058.452	2670.673	624.6906
Skewness	-0.045885	0.001239	0.306967	0.564623	0.167059	0.218351
Kurtosis	2.458236	2.093301	2.242516	2.591724	2.071411	2.884237
Jarque-Bera	0.779985	2.123783	2.455966	3.724871	2.515941	0.527281
Probability	0.677062	0.345801	0.292883	0.155294	0.284230	0.768250
Observations	62	62	62	62	62	62

Source: Author's Calculation by using Eviews

The computed p-value of all the 6 indices is greater than 0.05 or 5% and thus here null hypothesis is accepted. Hence it can be said that the residualfollows normal distribution and can be used for further study. Here, it was also found that Skewness of distribution is a greater than 0.00. It is also clear that Stock index of India (Sensex) is negatively skewed, while all indices of US (NASDAQ), UK (LSE), Japan (Nikkei), China (Shanghai) and Europe (ENX) are positively skewed. Kurtosis is a measure of peakness and the fat tailsthat associate with less density in the middle; a normal distribution has kurtosis equals to 3.0 or excess.Therefore Sensex, NASDAQ, Shanghai, Nikkei, LSE and ENX indices follow platykurtic distribution.

Average of Major One Month Rises and fall of Selected Stock Markets: The Shanghai has uppermost average rise of 20.57% and average fall of 22.65%. The next one is LSE with a rise and fall of 17.72% and -9.84%, respectively. The positive difference in rise & fall is found in SENSEX (2.66%), Nikkei (0.12%), and NASDAQ (1.52%) and ENX (0.85). The negative difference in rise & fall is found in Shanghai (-2.08%).

UNIT ROOT TEST

H_0 = Data has Unit Root (Non-Stationary).

H_1 = Data does not have Unit Root (Stationary).

Table-4: ADF Test results for all selected Stock Exchanges at Level and at 1st Difference

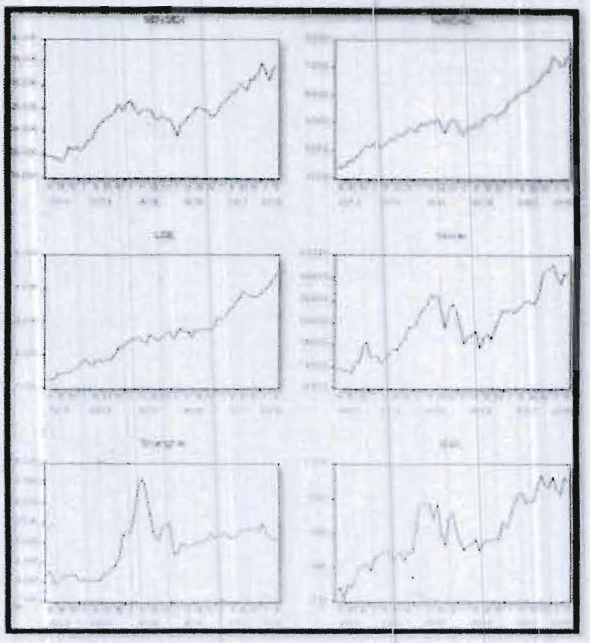
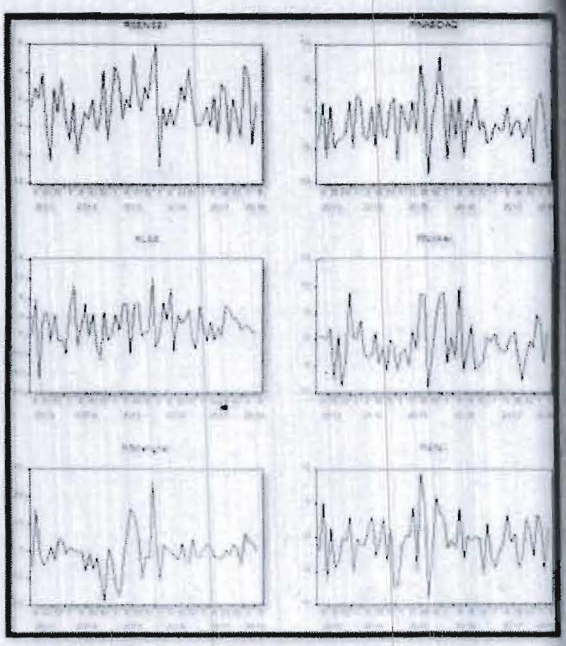
Sl. No	Stock Exchanges	Level			First Difference		
		ADF T-Statistic	P-Value	Hypothesis	ADF T-Statistic	P-Value	Hypothesis
1	BSE - SENSEX	0.71353	0.8352	Rejected H_0	8.234457	0.000	Accepted H_0
2	NASDAQ	0.147296	0.9668	Rejected H_0	8.834113	0.000	Accepted H_0
3	LSE	0.467764	0.9842	Rejected H_0	9.199742	0.000	Accepted H_0
4	NIKKEI	1.064281	0.7244	Rejected H_0	7.189711	0.000	Accepted H_0
5	SHANGHAI	2.092536	0.2484	Rejected H_0	5.556536	0.000	Accepted H_0
6	ENX	1.567058	0.4931	Rejected H_0	8.585373	0.000	Accepted H_0

Source: Author's Calculation by using Eviews, ADF Test

All the selected stock index of the world has a unit root (applied ADF test). As the p-values of all the selected stock exchanges is greater than 5% we accept Null Hypothesis and conclude that the data are non-stationary at Level. The graph 2 shows the at level indices value and at 1st difference the indices value, that also help to differentiate the Nos- Stationary and Stationary data set.

ISSN 2394 - 778

Graph-1: Indices value at Level and at Log Return

Indicies value at level	Indicies value at 1st difference
	

MULTIPLE REGRESSION ANALYSIS

H_0 = There is no significant impact between Global Stock Exchanges to Indian Stock Market H_1 = There is a significant impact between Global Stock Exchanges to Indian Stock Market **Table 5: Multiple Regression Analysis**

Dependent Variable: RSENSEX				
Method: Least Squares				
Date: 01/10/19 Time: 15:53				
Sample (adjusted): 2013M04 2018M04				
Included observations: 61 after adjustments				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	-0.286086	0.464675	-0.615668	0.5407
RENX	0.167010	0.165692	1.007955	0.3179
RLSE	-0.061974	0.103098	-0.601110	0.5502
RNASDAQ	0.510207	0.197295	2.586016	0.0124
RNIKKEI	0.105110	0.135494	0.775755	0.4412
RSHANGHAI	-0.062912	0.068876	-0.913413	0.3650
R-squared	0.328372	Mean dependent var.		-0.973587
Adjusted R-squared	0.267314	S.D. dependent var.		3.817357
S.E. of regression	3.267545	Akaike info criterion		5.299136
Sum squared resid	587.2268	Schwarz criterion		5.506763
Log likelihood	-155.6236	Hannan-Quinn criter.		5.380507
F-statistic	5.378104	Durbin-Watson stat		2.112173
Prob(F-statistic)	0.000427			

Source: Author's Calculation by using Eviews

The coefficient is negative and Durbin Watson stat value is more than 2 which indicates the model fitness. All the stock market indices except for NASDAQ accept the null hypothesis. In case of NASDAQ the t-Statics result is significant which indicates that there is a possibility of NASDAQ stock market will influence the Indian stock market. And also it can be seen that, the Durbin Watson statistic is 2.11 which is above 2it means that there is no serial correlation in the model.

GRANGER CAUSALITY TEST

Table-6: Selection of VAR Lag Order

VAR Lag Order Selection Criteria						
Endogenous variables: SENSEX ENX LSE NASDAQ NIKKEI SHANGHAI						
Exogenous variables: C						
Date: 01/14/19 Time: 10:04						
Sample: 2013M04 2018M05						
Included observations: 57						
Lag	**LogL**	**LR**	**FPE**	**AIC**	**SC**	**HQ**
0	-2499.626	NA	6.12e+30	87.91669	88.13175	88.00027
1	-2241.748	452.4164	2.56e+27	80.13152	81.63693*	80.71658*
2	-2201.072	62.79936*	2.27e+27*	79.96742*	82.76318	81.05395
3	-2179.923	28.19765	4.26e+27	80.48854	84.57464	82.07654
4	-2141.295	43.37208	4.86e+27	80.39632	85.77277	82.48579
5	-2096.833	40.56205	5.43e+27	80.09940	86.76620	82.69034
* 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						

Source: Author's Calculation by using Eviews

Table-7: Summary result of Granger Causality between selected global stock exchanges

VEC Granger Causality/Block Exogeneity Wald Tests			
Date: 02/14/19 Time: 10:09			
Sample: 2013M04 2018M05			
Included observations: 59			
Dependent variable: D(SENSEX)			
Excluded	**Chi-sq**	**df**	**Prob.**
D(ENX)	0.259105	2	0.8785
D(LSE)	1.396526	2	0.4974
D(NASDAQ)	1.305562	2	0.5206
D(NIKKEI)	0.288011	2	0.8659
D(SHANGHAI)	5.212167	2	0.0738
All	7.984905	10	0.6303

Source: Author's Calculation by using Eviews

Summary of the VEC Granger Causality or Block Exogenity Wald Test results helps us to understand the condition of each stock exchange individually. It is performed among all pairsof selected stock markets to determine direction of causality, result of null hypotheses which are accepted at 5% level of significancefor Indian market are reported in table 6.

Overall, this study has found no unidirectional and all bi-directional Granger causality effect in between the selected stock markets.

COINTEGRATION TEST

Table-7: Results of Co-Integration Test

Date: 01/13/19 Time: 16:18				
Sample (adjusted): 2013M06 2018M05				
Included observations: 60 after adjustments				
Trend assumption: Linear deterministic trend				
Series: SENSEX ENX LSE NASDAQ NIKKEI SHANGHAI				
Lags interval (in first differences): 1 to 1				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	

ISSN 2394 - 77

No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.453712	97.77299	95.75366	0.0360
At most 1	0.297493	61.49644	69.81889	0.1923
At most 2	0.292210	40.31042	47.85613	0.2116
At most 3	0.148030	19.57399	29.79707	0.4522
At most 4	0.136429	9.961774	15.49471	0.2837
At most 5	0.019164	1.161027	3.841466	0.2813
Trace test indicates 1 cointegratingeqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.453712	36.27656	40.07757	0.1261
At most 1	0.297493	21.18602	33.87687	0.6701
At most 2	0.292210	20.73643	27.58434	0.2925
At most 3	0.148030	9.612215	21.13162	0.7802
At most 4	0.136429	8.800747	14.26460	0.3031
At most 5	0.019164	1.161027	3.841466	0.2813
Max-eigenvalue test indicates no cointegration at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Source: Author's Calculation by using Eviews

Johansen Test of cointegration presents the Trace and Maximum Eigenvalue performed to determine the order of integration, in this trace indicates that should reject null hypothesis that of none and accept null for Trace and Maximum Eigenvalue for both at most one cointegrating or error since p-value is greater than 0.05 which indicates that, selected six variables are have long run relationship. Since the entirevariable iscointegrated the further VECM can be run.

VECTOR ERROR CORRECTION MODEL (VECM)

Table-7: Results of VECTOR ERROR CORRECTION ESTIMATES

Vector Error Correction Estimates				
Date: 01/14/19 Time: 16:34				
Sample (adjusted): 2013M07 2018M05				
Included observations: 59 after adjustments				
Standard errors in ( ) & t-statistics in [ ]				
CointegratingEq:	CointEq1			
SENSEX(-1)	1.000000			
ENX(-1)	35.19541			
	(10.0886)			
	[3.48865]			
LSE(-1)	3.170676			
	(1.43326)			
	[2.21220]			
NASDAQ(-1)	-7.619295			
	(1.54547)			
	[-4.93009]			
NIKKEI(-1)	-0.178707			
	(0.41243)			
	[-0.43330]			
SHANGHAI(-1)	-4.391319			
	(0.94372)			
	[-4.65319]			
C	-11983.95			

ISSN 2394 - 7780

Error Correction:	D(SENSEX)	D(ENX)	D(LSE)	D(NASDAQ)
CointEq1	-0.054439	-0.003805	0.000383	-0.002948
	(0.11503)	(0.00333)	(0.01357)	(0.01840)
	[-0.47326]	[-1.14390]	[0.02821]	[-0.16023]
D(SENSEX(-1))	0.159285	0.003549	-0.003567	0.064361
	(0.22345)	(0.00646)	(0.02637)	(0.03574)
	[0.71285]	[0.54915]	[-0.13530]	[1.80101]
D(SENSEX(-2))	0.029165	0.009331	0.007062	0.000400
	(0.23988)	(0.00694)	(0.02830)	(0.03836)
	[0.12158]	[1.34503]	[0.24950]	[0.01042]
D(ENX(-1))	-0.616834	0.194551	0.911134	0.960214
	(7.34995)	(0.21256)	(0.86726)	(1.17548)
	[-0.08392]	[0.91525]	[1.05059]	[0.81687]
D(ENX(-2))	3.293499	-0.134984	-1.117798	-0.502095
	(6.61169)	(0.19121)	(0.78015)	(1.05741)
	[0.49813]	[-0.70593]	[-1.43281]	[-0.47484]
D(LSE(-1))	-0.620448	-0.024964	-0.157598	-0.219514
	(1.44642)	(0.04183)	(0.17067)	(0.23133)
	[-0.42895]	[-0.59678]	[-0.92340]	[-0.94894]
D(LSE(-2))	-1.640570	0.009016	-0.133716	-0.414938
	(1.42008)	(0.04107)	(0.16756)	(0.22711)
	[-1.15526]	[0.21952]	[-0.79801]	[-1.82701]
D(NASDAQ(-1))	-2.238394	-0.076253	-0.144403	-0.618037
	(1.97323)	(0.05707)	(0.23283)	(0.31558)
	[-1.13438]	[-1.33619]	[-0.62020]	[-1.95842]
D(NASDAQ(-2))	-0.570098	-0.059236	0.003051	0.015268
	(1.68220)	(0.04865)	(0.19849)	(0.26903)
	[-0.33890]	[-1.21760]	[0.01537]	[0.05675]
D(NIKKEI(-1))	-0.050532	-0.012698	-0.013163	0.003295
	(0.27521)	(0.00796)	(0.03247)	(0.04401)
	[-0.18361]	[-1.59534]	[-0.40536]	[0.07487]
D(NIKKEI(-2))	-0.138874	-0.002809	0.047643	0.020129
	(0.27471)	(0.00794)	(0.03241)	(0.04393)
	[-0.50554]	[-0.35357]	[1.46983]	[0.45816]
D(SHANGHAI(-1))	1.802048	0.068257	-0.007966	0.267304
	(0.78947)	(0.02283)	(0.09315)	(0.12626)
	[2.28259]	[2.98953]	[-0.08552]	[2.11709]
D(SHANGHAI(-2))	-0.582780	0.009329	-0.020673	-0.182692
	(0.86442)	(0.02500)	(0.10200)	(0.13825)
	[-0.67418]	[0.37316]	[-0.20268]	[-1.32149]
C	505.4524	12.80004	74.22232	113.5512
	(179.321)	(5.18606)	(21.1590)	(28.6787)
	[2.81871]	[2.46816]	[3.50784]	[3.95943]
R-squared	0.175232	0.296425	0.167446	0.258091
Adj. R-squared	-0.063035	0.093170	-0.073070	0.043761
Sum sq. resids	51899916	43409.14	722594.8	1327473.
S.E. equation	1073.933	31.05878	126.7188	171.7539
F-statistic	0.735444	1.458389	0.696195	1.204178
Log likelihood	-487.4924	-278.4436	-361.4028	-379.3443
Akaike AIC	16.99974	9.913341	12.72552	13.33370
Schwarz SC	17.49272	10.40632	13.21849	13.82668
Mean dependent	269.9419	5.851186	55.00678	68.45542
S.D. dependent	1041.606	32.61530	122.3284	175.6400
Determinant resid covariance (dof adj.)		9.87E+26		
Determinant resid covariance		1.94E+26		

ISSN 2394 - 778

Log likelihood	-2287.979		
Akaike information criterion	80.60947		
Schwarz criterion	83.77859		

Source: Author's Calculation by using Eviews

Table-7: Results of VECM

Dependent Variable: D(SENSEX)				
Method: Least Squares (Gauss-Newton / Marquardt steps)				
Date: 02/13/19 Time: 16:46				
Sample (adjusted): 2013M07 2018M05				
Included observations: 59 after adjustments				
D(SENSEX) = C(1)*(SENSEX(-1) + 35.195411403*ENX(-1) + 3.17067557691*LSE(-1) - 7.61929502798*NASDAQ(-1) - 0.178707411981*NIKKEI(-1) - 4.39131929731*SHANGHAI(-1) - 11983.9538319) + C(2)*D(SENSEX(-1)) + C(3)*D(SENSEX(-2)) + C(4) *D(ENX(-1)) + C(5)*D(ENX(-2)) + C(6)*D(LSE(-1)) + C(7)*D(LSE(-2)) + C(8)*D(NASDAQ(-1)) + C(9)*D(NASDAQ(-2)) + C(10)*D(NIKKEI(-1)) + C(11)*D(NIKKEI(-2)) + C(12)*D(SHANGHAI(-1)) + C(13)*D(SHANGHAI(-2)) + C(14)				
	Coefficient	**Std. Error**	**t-Statistic**	**Prob.**
C(1)	-0.054439	0.115028	-0.473263	0.6383
C(2)	0.159285	0.223448	0.712848	0.4796
C(3)	0.029165	0.239879	0.121581	0.9038
C(4)	-0.616834	7.349948	-0.083924	0.9335
C(5)	3.293499	6.611688	0.498133	0.6208
C(6)	-0.620448	1.446417	-0.428955	0.6700
C(7)	-1.640570	1.420085	-1.155262	0.2541
C(8)	-2.238394	1.973234	-1.134379	0.2626
C(9)	-0.570098	1.682196	-0.338901	0.7363
C(10)	-0.050532	0.275211	-0.183610	0.8551
C(11)	-0.138874	0.274706	-0.505536	0.6156
C(12)	1.802048	0.789474	2.282593	0.0272
C(13)	-0.582780	0.864423	-0.674184	0.5036
C(14)	505.4524	179.3205	2.818709	0.0071
R-squared	0.175232	Mean dependent var		269.9419
Adjusted R-squared	-0.063035	S.D. dependent var		1041.606
S.E. of regression	1073.933	Akaike info criterion		16.99974
Sum squared resid	51899916	Schwarz criterion		17.49272
Log likelihood	-487.4924	Hannan-Quinn criter.		17.19218
F-statistic	0.735444	Durbin-Watson stat		1.966988
Prob(F-statistic)	0.719417			

Source: Author's Calculation by using Eviews

The C(1) is coefficient of long run cointegreted model with Sensex as the dependent variable while C(2) to C(13) are short run coefficients. Among all C(12) is speed of adjustment towards long run equilibrium which is significant and C(14) is constant value. This indicates that world stock market has long run influence on Indian stock market.

CONCLUSION

This study has tried to investigate the interrelationship, Interdependencies and causal relationships among Indian stock market and the selected major stock exchanges of the world. The Jarque-Bera test has pointed out normality if indices data series. Thus the ADF test conducted points out that all the data sets are stationary at first difference. Descriptive statistics reveals that BSE-Sensex is the quite uncertain market with high level of market return amongst all the developed stock markets as their standard deviation is higher.It is identified that there is long run relationship among six stock exchanges. There exists long-run relationship among the variables with -0.05444 as the speed of adjustment towards equilibrium. Selected six variables are all are trend and non-stationary but are co-integrated with at-most one co-integrating equation. Bidirectional or Unidirectional causality are not exists among the variables.

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