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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.

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CO-INTEGRATION OF INDIAN STOCK MARKET WITH US STOCK MARKET

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ABSTRACT

The paper investigates the long term relationship of Indian stock market with US stock market. For the research, daily closing data of NDX (Nasdaq) and Nifty a leading index of US stock market and Indian market were obtained from Bloomberg database. Total 4600 data set for 11 years from 01 January 2004 to 30 December 2014 were collected. These data have been cleaned manually. After cleaning 2416 synchronized data set is used for analysis. The researcher has employed Johansen Co-integration test and Granger causality test to confirm co-movements and causal relationship of Indian stock markets with the markets of developed countries. Unit root test using dickey fuller, augmented dickey fuller and Philip & Peron test is employed to check stationarity of the series. Unit root test suggest the indices are I (1) process. Johansen Co-integration test by both Trace test and Eigen value test confirms no co-integration of Indian financial market with any market of developed countries. Unrestricted VAR test confirms lag 1 and lag 2 of NIFTY is significant to influence NDX. Further Granger Causality test result shows Indian market do not granger cause or caused by US market.

KEYWORDS
co-movements, co-integration, stationarity, mean reversal, causality, unit root.

1. INTRODUCTION

Co-integration theory of econometrics has created lots of interest among economists in the last decade. It helps in understanding the long term relationship of two or more non-stationary time series data. If the combination of two non-stationary time series data is stationary, the series are cointegrated. A lots of economic series behaves like I (1) processes, i.e. they seem to drift all over the place but the second thing to notice is that they seem to drift in such a way that they do not drift away from each other. This means they are cointegrated. In this paper, Johansen test is employed to examine the co-integration. This method is more generally accepted tool for testing co-integration of several time series. This test is preferable than the Engle–Granger test as it permits more than one cointegrating relationship. The result of Johansen co-integration test showed no co-integration of Indian market with any of the markets of developing world. Therefore, for further research, Unrestricted VAR and granger causality test is employed. VAR helps in analyzing auto regression effect with its own lag and lag value of other variable. Granger causality test clarifies the cause and effect relations in time series variables. The paper is divided into four sections. Section one deals with the introduction and motivation for the research, in section 2 data and methodology is covered. Section 3 deals with empirical analysis. Last section presents brief analysis of results and conclusion.

1.1 MOTIVATION FOR THE RESEARCH

Numerous studies have been conducted on stock market integration. Markets of open economy have exhibited tighter co-movements with one and other. Several studies have also examined the relationships of Asian stock markets with US and other developed markets for different periods and the results are mixed. Some of the researchers have found co-movement some did not. Bhattacharya and Banerjee (2004) in their study for Germany, France, Korea, UK, Hong Kong, Japan, USA, Singapore, Taiwan, Mexico and India found that Causality effects are prominent in Asian capital markets. Ghosh et al. [1999] observed some evidence of co-integration among stock markets in Asian countries and the US whereas Chan et al. [1992] found no evidence of co-integration among the stock indices. Ripley (1973) studied co-integration for USA, UK, Austria, Belgium, Denmark, France, Germany, Italy, Netherlands, Norway, Sweden, Switzerland, Canada, Japan, Finland, Ireland, Australia, New Zealand, South Africa and observed that USA, Canada, Switzerland and Netherland move together. Liu et al. (1998) in his study of six countries – the U.S, Japan, Hong Kong, Singapore, Taiwan and Thailand for the period 1985-1990 found that U.S market possesses an influential role affecting the Asian-Pacific markets and degree of interdependence among the these markets increased substantially after the 1987 stock market crash.Eun and Shim (1989) studied the market movement for USA, UK, Australia, Canada, France, Germany, Hong Kong, Japan, Switzerland and found that USA exerts dominant influence.Pan, Liu and Roth (2000) in their research for the period from period 1988-1994 found that the US and five Asia-Pacifc stock markets (Australia,Hong Kong, Japan, Malaysia and Singapore) were highly integrated. Bayers and Peel (1993) examined for co-integration among the markets of USA, UK, Germany, Japan and Holland and observed no interdependency among the markets. Alexander and Thillainathan [1995] in their study found Granger causality but did not found co-integration among Asian stock markets. Arshanapalli and Doukas (1993) examined co-movement and interdependency of USA, UK, France, Germany and Japan and found Increasing degree of interdependence among world capital markets since the 1987 stock market crash, with Japan's Nikkei Index being exception. Hui (2005) has studied co-integration among the markets of USA, Australia, Hong Kong, Japan, New Zealand, Philippines, Singapore, South Korea, Taiwan and Thailand and ob-served that diversification exists in Asian countries. Pukthuanthong and Roll (2009) has studied a sample of 81 countries and found marked increase in stock market integration over the last three decades.

2. DATA AND METHODOLOGY

Co-integration analysis is one of the most important tool to find long term relationship in the time series variables. Though correlation analysis also helps to establish the relationship, but sometimes correlation can be spurious also. So it is said that "correlation does not imply causation". Co-integration analysis helps in establishing genuine co-movement where the cause and effect of variables is clearly visible. To check co-integration of Indian stock market US market, daily data set (closing price) of Nifty (India) and NDX (USA) is taken from 01 January 2004 to 30 December 2014 (11 years) from Bloomberg database. The data set includes 2416 synchronized daily observations of closing prices. Stationarity test and co-integration can be carried out on level series, but unit root tests such as: DF, ADF & PP test of level series has accepted the null hypothesis that it contains unit root. Therefore, log difference series (LN (Yt) – LN(Yt-$_1$) is tested for unit root. All the three-unit root tests DF, ADF & PP test suggest the indices are *I* (1) process. Log difference series is preferred over log return series because it stabilizes the behavior of level series by reducing the scales without changing the character. Log difference series is denoted by prefixing L with the name of level series.

2.1 JOHANSEN CO-INTEGRATION TEST

Johansen test for co-integration can be tested by two methods i.e. trace test and Eigen value test**.** Both the test may give inferences with small difference. Both methods of test address the co-integration presence hypothesis.

Co-integration of time series variables assumes the presence of common non-stationary (i.e. series are *I* (1)) processes underlying the input time series variables.

$$X_{1,t} = \alpha_1 + \gamma_1 Z_{1,t} + \gamma_2 Z_{2,t} + \cdots + \gamma_p Z_{p,t} + \epsilon_{1,t}$$
$$X_{2,t} = \alpha_2 + \phi_1 Z_{1,t} + \phi_2 Z_{2,t} + \cdots + \phi_p Z_{p,t} + \epsilon_{2,t}$$
$$X_{m,t} = \alpha_m + \psi_1 Z_{1,t} + \psi_2 Z_{2,t} + \cdots + \psi_p Z_{p,t} + \epsilon_{m,t}$$

The number of independent linear combinations (k) is related to the assumed number of common non-stationary underlying processes (p) as follows:

$$p = m - k$$

So, let's consider the following three possible outcomes:

1. $k=0, p=m$. When time series variables are not co-integrated

2.0 < k < m, 0 < p < m. When the time series variables are co-integrated.

3. $k=m, p=0$. When all the time-series variables are stationary ($I(0)$ to start with. Here co-integration is not relevant.

When we are examining the number of independent combinations, we are also examining the co-integration existence hypothesis indirectly.

2.1.1 TRACE TEST

The trace test tries to find out the number of linear combinations (K) to be equal to a given value (K_o), and the alternative hypothesis for K to be more than K_o

$$H_o : K = K_o$$
$$H_o : K > K_o$$

In the trace test, we set $K_o = 0$ (assuming no co-integration), and examine whether we can reject null hypothesis.

If we find at least one co-integration relationship. We need to reject the null hypothesis to establish the presence of Co-integration between the variables.

2.1.2 MAXIMUM EIGENVALUE TEST

In maximum eigenvalue test, we can reject the null hypothesis if there is only one possible linear combination of the non-stationary variables to yield a stationary process.

$$H_o : K = K_o$$
$$H_o : K = K_o + 1$$

The test may become less powerful than the trace test for the same K_o values.

2.2 VECTOR AUTOREGRESSION (VAR)

The **VAR** is used to capture the linear interdependencies among multiple time series. Each variable has an equation explaining its evolution based on its own lags and the lags of the other model variables.

A VAR model describes the evolution of a set of k variables (called endogenous variables) over the same sample period (t = 1,..., T) as a linear function of only their past values. The variables are collected in a k × 1 vector y_t, which has as the i th element, $y_{i,t}$, the observation at time "t" of the i th variable. For example, if the i th variable is GDP, then $y_{i,t}$ is the value of GDP at time t.

A *p-th order VAR*, denoted **VAR(*p*)**, is

$$y_t = c + A_1 y_{t-1} + A_2 y_{t-2} + \cdots + A_p y_{t-p} + e_t,$$

Where the *l*-periods back observation y_{t-l} is called the *l*-th ***lag*** of *y*, *c* is a *k* × 1 vector of constants (intercepts), A_i is a time-invariant *k* × *k* matrix and e_t is a *k* × 1 vector of error terms satisfying

1. $E(\epsilon_t) = 0$ Every error term has mean zero;
2. $E(\epsilon_t \epsilon_t') = \Omega$ — the contemporaneous covariance matrix of error terms is Ω (a *k* × *k* positive-semi definite matrix);
3. $E(\epsilon_t \epsilon_{t-k}') = 0$ for any non-zero *k* there is no correlation across time; in particular, no serial correlation in individual error terms.

A *p*th-order VAR is also called a **VAR with *p* lags**. Lag selection is very important as inference can be different for different lags.

2.3 GRANGER CAUSALITY TEST

Direction of causality between variables can be predicted by granger causality test as co-integration does not reveal anything about direction of causality. A variable x is said to Granger cause another variable y if past values of x help predict the current level of y if all other information is available. The simplest test of Granger causality requires estimating the following two regression equations, these are given as equation (1) and equation (2).

$$y_t = \beta_{1,0} + \sum_{i=1}^{p} \beta_{1,i} y_{t-i} + \sum_{j=1}^{p} \beta_{1,p+j} x_{t-i} + e_{1t} \quad (1)$$

$$x_t = \beta_{2,0} + \sum_{i=1}^{p} \beta_{2,i} y_{t-i} + \sum_{j=1}^{p} \beta_{2,p+j} x_{t-i} + e_{2t} \quad (2)$$

Where p is the number of lags that adequately models the dynamic structure so that the coefficients of further lags of variables are not statistically significant and the error terms e are white noise. The error terms may, however, be correlated across equations. If the p parameters are jointly significant then the null that x does not Granger cause y can be rejected. Similarly, if the p parameters are jointly significant then the null that y does not Granger cause x can be rejected. This test is usually referred to as the Granger causality test.

3. EMPIRICAL ANALYSIS

TABLE 1: SUMMARY STATISTICS OF LOG DIFFERENCE SERIES OF INVESTIGATED INDICES

	LNDX	LNIFTY
Mean	0.044	0.060
Maximum	10.368	16.226
Minimum	-11.115	-21.247
Std. Dev.	1.448	1.746
kewness	-0.377	-0.933
Kurtosis	8.867	20.454
Jarque-bera	3525.56	31044.66
Probability	0.000	0.000

TABLE 2: CORRELATION MATRIX (LEVEL SERIES)

	NDX	NIFTY
NDX	1	0.845477
NIFTY	0.845477	1

TABLE 3: CORRELATION MATRIX (LOG DIFFERENCE SERIES)

	LNDX	LNIFTY
LNDX	1	0.215931
LNIFTY	0.215931	1

Unit Root Test: To check the stationarity of the data Unit root test was conducted on level series and log difference series with and without trends. All the three methods DF, ADF and PP test were employed, and the results are as follows:

TABLE 4: SUMMARY OF UNIT ROOT TEST RESULT (LEVEL SERIES- WITHOUT TREND)

LEVEL SERIES- WITHOUT TREND						
	DF		ADF		PP	
Variables	1% level	t-Statistic	1% level	t-Statistic	1% level	t-Statistic
NDX	-2.565919	2.269653	-3.432860	1.214916	-3.432860	1.538632
NIFTY	-2.565919	1.185910	-3.432860	-0.549767	-3.432860	-0.546037

TABLE 5: SUMMARY OF UNIT ROOT TEST RESULT (LEVEL SERIES- WITH TREND AND INTERCEPT)

Level series With Trend and Intercept						
Variables	DF		ADF		PP	
Indices	1% level	t-Statistic	1% level	t-Statistic	1% level	t-Statistic
NDX	-3.480000	-0.583105	-3.961840	-0.820647	-3.961840	-0.576886
NIFTY	-3.480000	-2.310425	-3.961840	-2.252562	-3.961840	-2.298478

TABLE 6: SUMMARY OF UNIT ROOT TEST RESULT (LOG DIFFERENCE SERIES- WITHOUT TREND)

LOG DIFFERENCE SERIES- WITHOUT TREND						
Variables	DF		ADF		PP	
Indices	1% level	t-Statistic	1% level	t-Statistic	1% level	t-Statistic
LNDX	-2.565925	-4.666556	-3.432861	-53.82860	-3.432861	-54.03393
LNIFTY	-2.565924	-7.257182	-3.432861	-49.84929	-3.432861	-49.84521

TABLE 7: SUMMARY OF UNIT ROOT TEST RESULT (LOG DIFFERENCE SERIES- WITH TREND AND INTERCEPT)

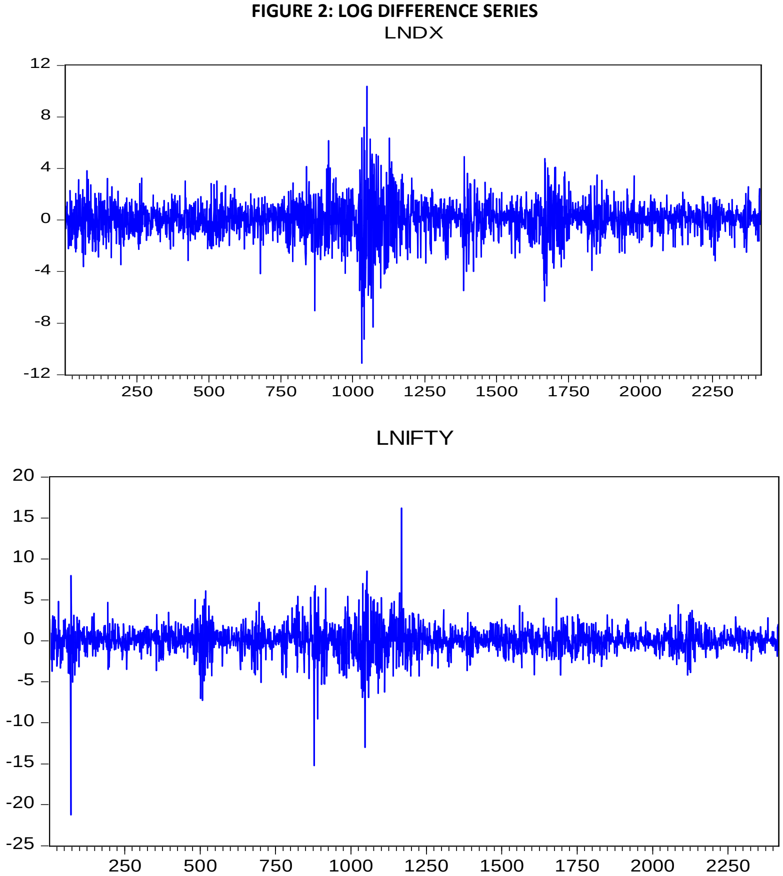
LOG DIFFERENCE SERIES- WITH TREND AND INTERCEPT						
	DF		ADF		PP	
Indices	1% level	t-Statistic	1% level	t-Statistic	1% level	t-Statistic
LNDX	-3.480000	-9.865815	-3.961841	-53.84701	-3.961841	-54.06079
LNIFTY	-3.480000	-48.13350	-3.961841	-49.84024	-3.961841	-49.83629

*LDAX indicates log difference series of DAX.

When value of t statistics (absolute value) more than the value at 1%, we can reject null hypothesis, Means the series are stationary. The result of all the three test DF, ADF & PP for log difference series shows that we can reject null hypothesis. So it is clear that level time series in study have a unit root at a level of significance of 1%. (T-statistic is always higher). But their difference series do not have a unit root. Therefore, they are all *I* (1) process and there is chances of co-integration.

A graphical presentation of log difference series is shown below. It is obvious from Graph that the series are mean reverting and therefore stationary.

FIGURE 2: LOG DIFFERENCE SERIES



3.2 To confirm long term relationship between two or more-time series variables, Co-integration test is most popular and suitable test. There are two methods of conducting Co-integration test**,** they are Trace test and Eigen value test. The Co-integration test of Nifty and NDX is conducted by both the methods.

RESULT OF CO-INTEGRATION TEST AT 5% LEVEL FOR NIFTY AND NDX IS GIVEN BELOW:

Unrestricted Co-integration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.001977	6.699867	15.49471	0.6128
At most 1	0.000796	1.921554	3.841466	0.1657

Trace test indicates no co-integration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Co-integration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.001977	4.778314	14.26460	0.7695
At most 1	0.000796	1.921554	3.841466	0.1657

Max-eigenvalue test indicates no co-integration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Johansson co-integration test outcome: Both trace test and Eigen value test indicates no co-integration at the 0.05 level. Therefore, Null hypothesis can not be rejected. Therefore, Nifty and NDX has no co-integration and no long run association between them.

3.3 Vector Auto Regression (VAR) tries to find out the interdependencies of a time series variable with itself and with others. VAR assumes that each variable is a function of past value (lag value) of its own and past value of other variable. The VAR of Nifty and NDX was tested to check the interdependency between the two. The result is as follows:

VAR OF NIFTY WITH NDX

	NIFTY	NDX
NIFTY(-1)	0.977824	-0.002681
	(0.02032)	(0.00786)
	[48.1227]	[-0.34100]
NIFTY(-2)	0.018303	0.002841
	(0.02029)	(0.00785)
	[0.90190]	[0.36192]
NDX(-1)	0.486381	0.945243
	(0.05329)	(0.02062)
	[9.12633]	[45.8468]
NDX(-2)	-0.478204	0.055511
	(0.05341)	(0.02066)
	[-8.95375]	[2.68667]
C	2.143419	-1.122115
	(4.52090)	(1.74896)
	[0.47411]	[-0.64159]

IFTY = C(1,1)*NIFTY(-1) + C(1,2)*NIFTY(-2) + C(1,3)*NDX(-1) + C(1,4)*NDX(-2) + C(1,5)
NDX = C(2,1)*NIFTY(-1) + C(2,2)*NIFTY(-2) + C(2,3)*NDX(-1) + C(2,4)*NDX(-2) + C(2,5) VAR Model - Substituted Coefficients:
NIFTY = 0.97782378152*NIFTY(-1) + 0.0183034449931*NIFTY(-2) + 0.486380626193*NDX(-1) - 0.478204381847*NDX(-2) + 2.14341861837
NDX = - 0.00268053279059*NIFTY(-1) + 0.00284146306611*NIFTY(-2) + 0.945242920087*NDX(-1) + 0.0555108979424*NDX(-2) - 1.12211490292

Result: NIFTY(-1), NIFTY(-2) is significant to influence NDX at 5% level.
NDX (-2), NIFTY (-2) is significant to influence NIFTY at 5% level.

3.4 Granger Causality Tests helps to understand whether one time series is useful in forecasting other time series i.e. the future values of one series can be predicted using past values of another time series.

RESULT OF GRANGER CAUSALITY TESTS OF NIFTY WITH NDX IS GIVEN BELOW:

Pairwise Granger Causality Tests			
Date: 08/27/15 Time: 10:31			
Sample: 1 2419			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
NDX does not Granger Cause NIFTY	2417	44.1045	2.E-19
NIFTY does not Granger Cause NDX		0.09463	0.9097

Outcome shows that Nifty neither granger cause NDX nor caused by it.

4. CONCLUSION

Financial markets across the world may fluctuate randomly but some of them might share long term equilibrium when they are co-integrated. This co-integration of stock market is very useful tool that helps portfolio managers to develop strategy on global diversification. If the indices of the countries are co-integrated, then diversification may not fetch desired result in risk minimization and return maximization. To confirm co-integration relationship, time series of daily closing value of both the indices have been tested for unit root. All the three-unit root test DF, ADF & PP have confirmed the process are *I* (1). After that Johanssen co-integration test is performed on NDX with NIFTY and no co-integration of Indian financial market is detected. For testing auto regression, unrestricted VAR test is applied by taking lag of 2. When serious are not co-integrated unrestricted VAR gives better result. Unrestricted VAR shows that lag 1 and lag 2 of NDX is not significant to influence Nifty at 5% level. At the same time lag 1 and 2 of nifty is significant to influence NDX. Granger causality test reveals that NDX does not granger cause NIFTY or caused by NIFTY.

REFERENCES

1. Alexander, R. Thillainathan, (1995) The Asian connections, Emerging Markets In-vestor 2(6), 42-46
2. Bekaert, G., Harvey, C.R., 1997. Emerging equity market volatility. Journal of Financial Economics, 43, 29–77.
3. Bekaert, G., Urias, M.S., 1996. Diversification and emerging market closed end funds. Journal of Finance 51, 835–869.
4. Bennett, P., Keleher, J., 1988. The international transmission of stock price disruption in October 1987, Federal Reserve Bank of New York. Quarterly Review 13, 17–33.
5. Bodurtha, J. Jr., Cho, D., Senbet, L., 1989. Economic forces and the stock market: an international perspective. The Global Finance Journal 1, 21–46.
6. Campbell, J., Hamao, Y., 1992. Predictable stock returns in the United States and Japan: a study of long-term capital market integration. Journal of Finance 47, 43–66.
7. Dwyer, G.P., Hafer, R.W., 1988. Are national stock markets linked? Federal Reserve Bank of St. Louis Review 70, 3–14.
8. Engle, R.F., Granger, C.W.J. (1987): Co-integration and Error Correction: Reprentation, Estimation and Testing. Econometrica 55(2), 251–276
9. Eun, C.S., Shim, S., 1989. International transmission of stock market movements. Journal of Financial and Quantitative Analysis 24, 241–256.
10. Ghosh, R. Saidi and K. H. Johnson, (1999) Who moves the Asia-Paci_c stock markets US or Japan? Empirical evidence based on the theory of co-integration, The Financial Review 34, 159-170.
11. Gujarati, D.N. (2003): Basic Econometrics, 4th edn. McGraw-Hill Companies, Inc., New York
12. Johansen, S. (1991): Estimation and Hypothesis Testing of Co-Integration Vectors in Gaussian Autoregressive Vector Models. Econometrica 59(2), 1551–1580
13. K. C. Chan, B. E. Gup and M.-S. Pan, (1992), An empirical analysis of stock prices in major Asian markets and the United States, Financial Review 27(2), 289-307
14. M.Bhattacharyya, A. Banerjee (2003), Integration of Global Capital markets: An empirical exploration, International journal of Theoretical and Applied finance 7(4), 385-405
15. M.S. Pan, Y. A. Liu and H. J. Roth, (1999), Common stochastic trends and volatility in Asian-Paci_c equity markets, Global Finance Journal 10(2), 161-172.

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