An Econometric Evaluation of the Stock Market Inter-linkages of BRICS Countries

Ms. RekhaGulia, Research Scholar, Singhania University

Dr. Harish Handa, Associate Professor, ShaheedBhagat Singh College, University of Delhi

Abstract

In this paper an attempt has been made to examine the causal relationship between the returns of stock exchanges of BRICS countries and looks at the integration of the Indian stock market with the other BRICS nations. An Econometric analysis of the daily returns of the stock markets of BRICS countries for a period beginningfromJune1,2009 throughMarch31,2015 is conducted in Eviews.LineChartsandUnit-Root Testare appliedtocheckthestationarityoftheseries;Granger'sCausalityModel and Johnsen Co-integrationTest areperformedtofindoutthelinkagesbetweenthemarkets understudy. The results show that the returns at Indian stock exchange Granger Cause the return at Russia, Brazil and South Africa stock Exchanges. Neither the China Stock returns are Granger caused by India Stock Exchange nor is the Indian Exchange is Granger Caused by China Stock Exchange. The co movement of the stock market indices in different countries posed a big challenge as they reduce the benefit of diversification of investment The Co-integration Test shows that the BRICS stock market is not co-integrated.

KeyWords: Inter-linkages, Stationary,Granger'sCausality, Co-integration

INTRODUCTION

After the practice of international portfolio diversification being established, institutional as well as individual investors from US and other developed and emerging countries have become increasingly interested in foreign equity markets. However, in the present situation, global markets have tended to become more integrated as a result of common practice towards liberalization and deregulation in the capital markets of both developed as well as emerging countries. These basic changes lead to increase the correlations among the stock prices of various national markets all over the world that would ensure the reduction in the potential benefits from international portfolio diversification.

In the recent decade, markets, businesses, regions, and continents have become more interdependent upon one another. This phenomenon encourages wide range of financial services and raising funds throughout the world. The globalization of economic activity, the increased world wealth, and the reduction in transaction costs associated with the information revolution all direct investors to consider the newly emerging financial markets. This process has led to the introduction of public share offerings to nearly two dozen countries and spawned a global market culture among millions of new investors.

The World Bank (1997) argues that the world's financial markets are rapidly integrating into a single global marketplace as investors are driven to developing countries in the search for higher returns. However, history has shown that few once-emerging economies, such as the United States and Japan have been successful. This has serve as motivation for investors to allocate their investment in emerging market

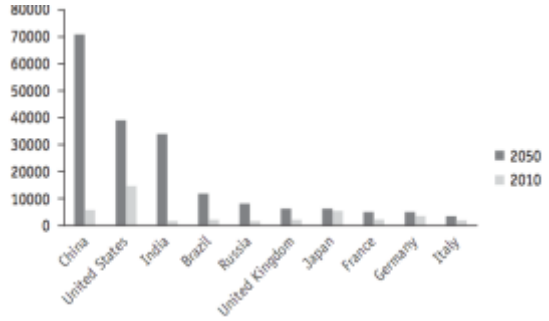
in order to enhance portfolio return and reducing risk through diversification. The risk and return in investing in emerging markets are significantly linked to the ability of these markets to develop economically.

At the end of the century more countries than ever participate in capital markets. Moreover, companies all around the globe increasingly rely on the stock market to raise funds. This process is aided by the progression of countries to privatize their holdings and to transfer ownership from the state to private investors.

This phenomenon is not restricted to the United States, where the number of listed companies has increased by more than five times since 1990 to more than 20,000, or Western Europe, where governments auctioned off large portions of state-owned enterprises to the public. Estimates by Morgan Stanley Capital International reveal that the combined market capitalization for the United Kingdom, Germany and France increased by 250% in the last decade. Moreover, whereas ten years ago, China, the Soviet Union and its former Eastern Block of satellite countries have just abandoned command economies, and were lacking any stock market, at the end of 2008 exchanges in these countries enlisted more than 1,500 publicly traded companies.

About BRICS

BRICS is the acronym for an association of five major emerging national economies : Brazil, Russia, India, China and South Africa. The grouping was originally known as "BRIC" before the inclusion of South Africa in 2010. Theacronym "BRIC" was coinedbyJimO'Neill, aglobal economist workingfor GoldmanSachs,ina 2001paperentitled"Building BetterGlobalEconomicBRICs".The acronymhascome intowidespreaduseasasymboloftheshift inglobal economicpoweraway from thedeveloped G7 economies towards thedevelopingworld. The BRICS members are all developing countries, but they are distinguished by their large, fast-growing economies and have significant influence on regional and global affairs.



GDP of Major Powers 2010 vs 2050 (in billions of Dollars)

Source:http://www.theatlantic.com/business/archive/2012/02/the-world-in-2050

OBJECTIVES OFTHE STUDY

Thestudyaims to achievethe followingobjectives:

1. To studythereturn patterns in the equitymarkets of 'BRICS' Brazil, Russia, India, China and South Africa
2. To find out thelinkages between thestockexchanges understudy; and
3. Toobservewhetherthereexistenoughopportunitiesfordiversificationamongthe stock exchanges ofBrazil, Russia,India, China and South Africa.

LITERATURE REVIEW

The presence of co-movements among national stock markets limits the benefit of

international diversification. A number of studies have examined co-movements of international stock markets. A considerable amount of work has been done on the interrelationships among the world equity markets, especially focus on the major developed markets like United States and Japan. The performances of developed markets draw the world attention before and after the crash of 1987. The predominant feature of the Crash in 1987 was its global scale. The equity markets of the world reacted to the collapse of the Dow Jones index of the New York Stock Exchange with their own version of a crash. The Crash of October1987 has made people realize that various national equity markets are so integrated. The developed markets e.g., the US exert a strong influence on other smaller markets. Eunand Shim (1989) use vector auto regression to study the interdependence among world equity markets and found evidence of co-movements among these markets with the US. By using a single equation model, Cheung and Mak (1992) examine the causal relationships between the Asian markets and the developed markets. They also found that the US market is an important global factor.

Asian capital markets are new stars among the emerging markets; many studies have been done in the 1990s and thereafter to study the co-movements between Asian markets and the stock markets in developed countries. Chan et al. (1992) conduct unit root and pairwise cointegration tests to examine the relationship among the Asian-Pacific markets and conclude that these Asian markets are not cointegrated. Chowdhury (1994) studies the relationships among four Newly Industrialized Economies (NIEs), Japan and US. He found that US market leads the four NIEs (Hong Kong, S. Korea, Singapore, and Taiwan) and there is significant link between the stock markets of Hong Kong and Singapore, Japan and US. Phyletic (1995) found that there has been an increase integration of capital markets in Pacific Basin Region with US and Japan. Kwan, Sim and Cotsomitis (1995) studied the stock markets of Australia, Hong Kong, Japan, Singapore, South Korea, Taiwan, United Kingdom, United States and Germany and suggest that these markets are not weak form efficient as they found significant lead-lag relationships between these equity markets. Cashin et al. (1995) use the cointegration tests to assess the extent to which equity prices move similarly across countries and regions. They report increased integration of emerging equity markets since the beginning of 1990 via greater regionalization of national stock markets. Besides, if national stock markets are subject to a global shock that causes them to deviate from their long-run equilibrium relationship, it takes several months for the long-run relationship to reassert itself.

Chaudhuri (1997) investigates the common trends in seven Asian markets by using the Johansen cointegration methodology and reported a single trend. Palac-McMiken (1997) uses the monthly ASEAN market indices (Indonesia, Malaysia, Philippines, Singapore and Thailand) between 1987 and 1995 and found that with the exception of Indonesia, all the markets are linked with each other and that these markets are not collectively efficient. He suggested that there is still room for diversification across these markets despite evidence of interdependence among ASEAN stock markets. Masih and Masih (1999) found the high level of interdependence among markets in Thailand, Malaysia, US, Japan, Hong Kong, and Singapore from 1992 to 1997. Johnson and Soenen (2002) studied the equity market integration between the Japanese stock market and the other twelve equity markets in Asia. They found that the equity markets of Australia, Hong Kong, Malaysia, New

Zealand, and Singapore are highly integrated with the stock market in Japan. They also found the evidence that these Asian markets are becoming more integrated over time and that a higher import share as well as a greater differential in inflation rates, real interest rates, and GDP growth rates have negative effects on stock market co-movements between country pairs. The results from Yang etal. (2003) show that both long-run cointegration relationships and short-run causal linkages among US, Japan and ten Asian emerging markets have been more integrated after the Asian Financial Crisis.

ThelinkageamongBRICstock markets isa subjectthathasattractedwideattention. NeilManning (Commontrendsandconvergence?SouthEast Asian equity markets,1988–1999)usingtheVARmodulehadconcludedhisstudyasthese circumstances, the Johansenapproachsayslittleaboutthe dynamicsofconvergencealthoughit clearlysignalsthe interdependenceofthesemarkets. AamirR.HashmiInterlinkagesamong SouthEastAsianStockMarkets(AComparison BetweenPre-andPost-1997-CrisisPeriods) usingthedataform1Jan1990to31July1997and applythetoolsof thecorrelationtest MultivariateGrangerCausalityTestsInorderto havesomeideaaboutthepropertiesofthedata iscompute basicstatisticsforallsevenseriesofreturnsforbothpre-andpost-crisisperiods.Meanandmedianaregenerallylowerforpostcrisisperiod.Variance ishigherafterthe crisis forall sevenmarkets. Noticeablearethepost-crisis variancenumbers(whichareallgreater than4)for KL,BKandJK.Changesinkurtosisare mixedand infourof thesevenmarketsithas increasedwhilefortheremaining threeithasdecreased.Althoughtheplotsofreturnsseries(not shownsuggeststationary, the testforunitrootsandareable torejectthenullofunitroots inall sevenseriesofreturnsforbothperiods. Inter-linkagesamong Asianmarkethavegenerally increasedaftertheemergenceofAsianfinancial crisisin1997.AcrosstheAsianEquityMarketsJanuary4,1988toDecember31,1999)Usingunitroottest and co-integration test, concluded that for the levelsof the raw (un-trended) series,none ofthetests,withtheexceptionofIndia,rejectthenullhypothesisofnonstationarityatthe5 percentlevel.However,oncethetrendcomponentisincorporated,thetestindicatesthatall equitymarketindices,including theIndianindex, arenonstationarityinthe levels.Consequently, co integrationtests areestimated ina mannerthat accommodates both interceptandtrendterms. Fortheoverallsampleperiod,evidencefromthe-maxandTraceteststatisticindicatesthatthere are two significant cointegrating vectors for both Group I and Group II countries. An examination ofthe individualsubperiodresults(specifically, the–maxtest)suggestthatthere is more thanonecointegrating relationshipwiththeinclusionofJapanandtheUnitedStatesinthe system.

It appears that previous empirical studies on the relationship between world stock markets do not provide consistent results. The reasons for the inconsistent results are numerous, including the choice of markets, different sample periods, different frequency of observations, and the different methodologies employed.

RESEARCH METHODOLOGY

The present research is a study of thelinkagesbetweenthestockexchangesofBrazil,Russia,India, China and South Africa. We use one stockexchange fromeachof the three countriesasa representative of the respectivecountry.TheBrazilStockExchange

istakenasthe benchmarkofBraziland the index ofBM&FBOVESPAisused. ForRussia,theRussiaStockExchange(RTS)is takenasthe representativeexchangeand theAll Share PriceIndex(ASPI) is used. National Stock Exchange fromIndiaistakenasbenchmarkindexandthe Nifty GeneralIndexisused.ShanghaiStock Exchange(SSE)istakenasthebenchmarkstoc kexchangeforChina. The FTSE JSE is taken as a representative exchange for South Africa. Thedailyclosingevelsofthefive representativendicesforaperiodbeginningfro m1st June 2009 through31st March2015 isconsidered the reference period.Inthisway,data of total70 monthsare takenfor thepurposeofthestudy. For the days when either of the stock market is closed, taking Indian Stock Market as base, the missing values are calculated by taking the average of the two nearest values.

Datahavebeenanalyzedusingeconometrictoo ls.

Theanalysisofeconometricscanbeperformedo naseriesofstationary nature.Inordertocheck whether or not the series are stationary, we prepare the line graph for each of the series. In order to further confirm the (stationary) nature of the series, correlogram is prepared for each of the series. Further, we perform the Augmented Dickey-Fuller test under the unit root test to finally confirm whether or not the series are stationary.Forthebasicunderstanding ofUnitroot testing, wemaylookat the following equation

$y_t=\rho y_{t-1}+x_t'\delta+\varepsilon_t$,(1.1)

Wherex_t areoptionalexogenousrepressorswhichmayco nsistofconstant,oraconstantand trend,ρandδareparameterstobeestimated,and the$\varepsilon_t$areassumedtobewhitenoise.If|ρ| isanonstationarityseriesandthevarianceofyinc reaseswithtimeandapproachesinfinity.If |ρ|<1,y isatrend-stationary series.Thus,weevaluatethehypothesisoftrend-)stationary by testingwhetherthe absolutevalueof|ρ|is strictlyless than one.TheStandardDickey-Fullertestiscarriedoutbyestimatingequation(1 .2)aftersubtractingy$_{t-1}$from both sides ofthe equation.

$\Delta y_t=\alpha y_{t-1}+x_t'\delta+\varepsilon_t$,(1.2)

Where$\alpha=\rho-1$.

Thenulland alternativehypotheses maybewritten as,

$H_0:\alpha=0 H_1:\alpha<0$(1.3)

Inordertomaketheseriesstationary,wetaketh elogofthefiveseriesandarriveatthedaily returnoftheseries.Alltheremaininganalysisis performedatthedaily return(logofthe series)ofthefive exchanges. These variables are named as LOGBZ, LOGCH, LOGRUS, LOGIN and LOGSA.

Atthestationarylogseriesofthe five stockexchanges,weperformtheGranger'sca usality modelinorder toobserve whether thereturnateachstockexchangegrangercause s the returnat thestock exchanges. TheGranger(1969)approachtothequestionof whetherxcausesy istoseehowmuchofthe currentycanbeexplainedby pastvaluesofyandthentoseewhetheraddingla ggedvaluesofx canimprovetheexplanation. yissaidtobeGranger-caused by xifxhelpsinthepredictionofy,orequivalentlyi fthecoefficientsonthelaggedx'sarestatistical lysignificant.Itispertinentto notethattwo-way causationisfrequentlythe case;xGrangercausesyandy Grangercausesx.It isimportanttonotethatthestatement"xGrang ercausesy"doesnotimplythatyistheeffector theresultofx.Grangercausality measuresprecedenceandinformationcontent butdoesnotby itselfindicatecausality inthemorecommonuseoftheterm.InGranger 'sCausality,thereare bivariateregressions oftheunder-mentioned form–

$y_t=\alpha_0+\alpha_1 y_{t-1}+\ldots\ldots+\alpha_l y_{t-l}+\beta_1 x_{t-}$

$1^{+}\ldots\ldots +\beta l x_{t-l} +\varepsilon_t$

$x_t=\alpha 0+\alpha 1 x_{t-1}^{+}\ldots\ldots +\alpha l x_{t-l} +\beta 1 y_{t-1}^{+}\ldots\ldots +\beta l y_{t-l} +\mu_t$(1.4)

forallpossiblepairsof(x,y)seriesinthegroup.Inequation(1.4),wetakelagsrangingfrom1 tol.InGranger'smodel,onecanpickalag length,lthatcorrespondsto reasonable beliefsabout thelongest timeover which oneofthevariablescouldhelp predict theother.

The reported F-statistics aretheWald statistics forthejoint hypothesis:

$\beta_1=\beta_2=\ldots\ldots\ldots=\beta_t=0$ (1.5)

foreachequation.

ThenullhypothesisisthatxdoesnotGranger-causey inthefirstregression and thatydoes not Granger-causexin thesecondregression.

Data Analysis

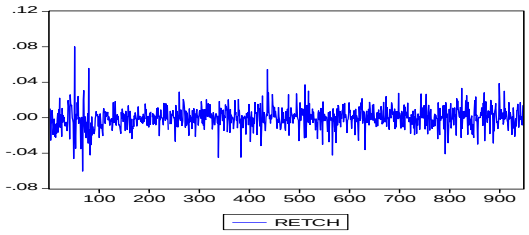
The data taken for the returns of the stock indices of the BRICS, ie, Brazil, Russia, India,China and South Africa is statistically evaluated in this section. The Descriptive Statistics for the return series of the countries under study is shown in Table 1. The descriptive statistics shows that the return indices are not normally distributed. These are positively skewed which means these series have a long right tail. The kurtosis for the normal distributed series is 3. The Kurtosis is more than 3 for Russia and China, it infers that these return series are peaked (leptokurtic) and for India, China and South Africa it can be inferred that these return series are Mesokurtic as their Kurtosis value is less than 3.

Table 1

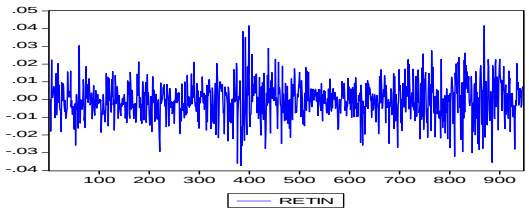
Descriptive Statistics						
	Total	India	South Africa	Brazil	Russia	China
Mean	734984.7	6198.471	36544.16	55251.71	1468.471	2337.397
Median	734982.5	5873.225	35950.5	55082.84	1462.82	2240.51
Maximum	735687	8996.25	47325	68394.33	1838.18	3786.57
Minimum	734288	4544.2	25193	44965.66	1237.43	1950.01
Std. Dev.	404.3378	1155.218	6527.613	4933.992	101.8531	344.159
Skewness	0.012828	0.938907	0.128116	0.207556	0.855373	1.842381
Kurtosis	1.810875	2.671198	1.611822	2.541951	4.090689	6.252295
Jarque-Bera	55.29028	142.8403	77.8811	14.9348	160.8768	944.0536
Probability	0	0	0	0.000571	0	0
Sum	6.89E+08	5814165	34278419	51826100	1377426	2192478
Observations	938	938	938	938	938	938

The five series representing the stock indices of the BRICS are statistically analysed in Eviews. For Econometric analysis, it is essential to make sure that the series under study are stationary. In order to make the series stationary, log is taken. All the analysis has been done on the log series. The series is stationary at first difference. In order to make the series stationary, line graphs are prepared. The line graphs are shown below

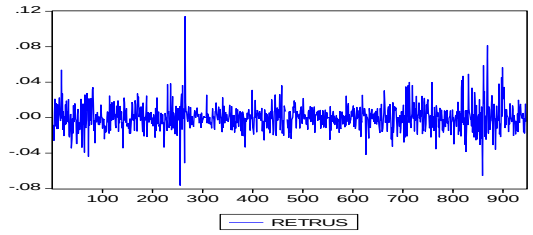
Graph 1



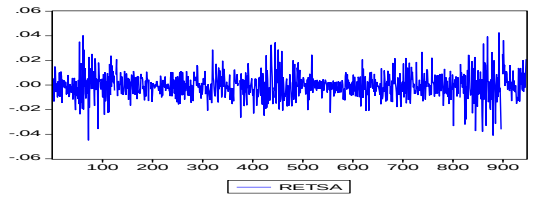
Graph 2



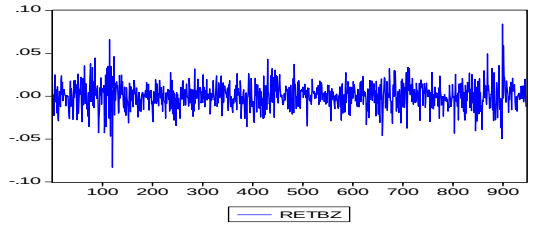
Graph 3



Graph 4



Graph 5



Figures1to5demonstratethe line graphsof thereturns of the five stock exchanges. RETCH, RETIN, RETRUS, RETSA,RETBZ represents the first difference series.Itisindicatedfromthe figuresthatreturnsatallthe five stockexchangesarestationary.Inorder tofurther checkthestationarity ofthethree series,weperformthecorrelogramandtheUnitRootTestin ordertofurtherconfirmthesame.Table2-6summarizestheunitroottestofreturn.

Augmented Dickey Fuller Unit Root Test

Table 2

Augmented Dickey-Fuller Test Equation Dependent Variable: D(LOGBZ,2) Method: Least Squares Sample (adjusted): 3 946 Included observations: 944 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOGBZ(-1))	-1.051282	0.032551	-32.29628	0
C	0.000238	0.000493	0.482676	0.6294
R-squared	0.525453	Mean dependent var		-1.53E-05
Adjusted R-squared	0.524949	S.D. dependent var		0.021983
S.E. of regression	0.015151	Akaike info criterion		-5.53932
Sum squared resid	0.216252	Schwarz criterion		-5.52905
Log likelihood	2616.561	F-statistic		1043.05
Durbin-Watson stat	1.994581	Prob(F-statistic)		0

Table 3

Augmented Dickey-Fuller Test Equation Dependent Variable: D(LOGIN,2) Method: Least Squares Sample (adjusted): 3 946 Included observations: 944 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOGIN(-1))	-0.904316	0.032442	-27.8748	0
C	-0.0004	0.000341	-1.17091	0.2419
R-squared	0.452008	Mean dependent var		7.76E-06
Adjusted R-squared	0.451427	S.D. dependent var		0.014141
S.E. of regression	0.010474	Akaike info criterion		-6.27779
Sum squared resid	0.103335	Schwarz criterion		-6.26752
Log likelihood	2965.118	F-statistic		777.0042
Durbin-Watson stat	1.990779	Prob(F-statistic)		0

Table 4

Augmented Dickey-Fuller Test Equation Dependent Variable: D(LOGRUS,2) Method: Least Squares Sample (adjusted): 3 946 Included observations: 941 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOGRUS(-1))	-1.015238	0.03263	-31.1139	0
C	2.19E-05	0.000477	0.045798	0.9635
R-squared	0.507623	Mean dependent var		1.31E-05
Adjusted R-squared	0.507098	S.D. dependent var		0.020847
S.E. of regression	0.014636	Akaike info criterion		-5.60851
Sum squared resid	0.201152	Schwarz criterion		-5.59821
Log likelihood	2640.803	F-statistic		968.0746
Durbin-Watson stat	2.000189	Prob(F-statistic)		0

Table 5

Augmented Dickey-Fuller Test Equation Dependent Variable: D(LOGSA,2) Method: Least Squares Sample (adjusted): 4 946 Included observations: 923 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOGSA(-1))	-1.153335	0.049118	-23.48079	0
D(LOGSA(-1),2)	0.049125	0.033036	1.487003	0.1374
C	-0.000665	0.000343	-1.938935	0.0528
R-squared	0.548661	Mean dependent var		-6.02E-05
Adjusted R-squared	0.54768	S.D. dependent var		0.015463
S.E. of regression	0.010399	Akaike info criterion		-6.29087
Sum squared resid	0.099498	Schwarz criterion		-6.27518
Log likelihood	2906.238	F-statistic		559.1905
Durbin-Watson stat	1.979944	Prob(F-statistic)		0

Table 6

Augmented Dickey-Fuller Test Equation Dependent Variable: D(LOGCH,2) Method: Least Squares Sample (adjusted): 20 946 Included observations: 887 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOGCH(-1))	-0.759162	0.130527	-5.816124	0
D(LOGCH(-1),2)	-0.253254	0.127826	-1.981241	0.0479
C	-5.10E-05	0.000405	-0.125979	0.8998
R-squared	0.524125	Mean dependent var		-1.48E-05
Adjusted R-squared	0.514256	S.D. dependent var		0.017215
S.E. of regression	0.011998	Akaike info criterion		-5.98695
Sum squared resid	0.124953	Schwarz criterion		-5.88439
Log likelihood	2674.21	F-statistic		53.11151
Durbin-Watson stat	1.999118	Prob(F-statistic)		0

With the Unit-RootTest,thenull hypothesisthatseriesReturnatthebenchmarkexchanges andindiceshasaunit-rootistested.Probability valueoflessthan0.05intable impliesthatthe Null hypothesisisrejectedandthe variabledoesnothaveaunit-root,whichconfirmsthatthe series isstationary. Similar kindof results isvisible from the AugmentedDickey-Fuller test in table.Afterconfirming thatthe fiveseriesarestationary in nature, the pair wiseGranger's Causalityanalysis on the benchmark indices is performed. Table 7 presents thefindings of pair wise Granger's Causalityforthestock exchanges understudy.

Table 7

Pairwise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Probability	Causal Relationship
RETRUS does not Granger Cause RETIN	939	0.61277	0.54207	No
RETIN does not Granger Cause RETRUS		8.72662	0.00018	Yes
RETSA does not Granger Cause RETIN	923	0.75633	0.46968	No
RETIN does not Granger Cause RETSA		10.3478	3.60E-05	Yes
RETCH does not Granger Cause RETIN	935	0.60293	0.54742	No
RETIN does not Granger Cause RETCH		0.33782	0.71341	No
RETBZ does not Granger Cause RETIN	943	0.26807	0.76492	No
RETIN does not Granger Cause RETBZ		27.0658	3.70E-12	Yes

Table 7presentsthefindings of the Granger'sCausality modeltothebenchmark indices fromBrazil, Russia,India,China and South Africa. Null hypothesis in the caseofGranger's causalitymodel is that'A'doesnotgranger cause 'B'.On thoselines,table tests thehypothesesabout the four stockexchangesinpair with India.Intableweparticularlyobservethepro bability value(showninthelast column).Wetest thenullhypothesisat5%levelofsignificance forwhichtheprobabilityvalue oflessthan0.05impliesthatthenullhypothesi scanberejectedwhilefortheprobabilityvalu e ofmorethan0.05,weshallaccept thenull hypothesis.Theresultsshowthattheprobabil ity value for the hypothesis at 2 lags.

The Probability value of the hypothesis: RETRUS does not Granger Cause RETIN, RETSA does not Granger Cause RETIN, RETCH does not Granger Cause RETIN, RETIN does not Granger Cause RETCH, RETBZ does not Granger Cause RETIN is more than 0.05, which implies that null hypothesis cannot be rejected. Whereas the probability value of hypothesis: RETIN does not Granger Cause RETRUS, RETIN does notGranger Cause RETSA, RETIN does not Granger Cause RETBZ is lower than 0.05, which means the null hypothesis

in can be rejected.

This implies that the return at Indian stock exchange Granger Cause the return at Russia, Brazil and South Africa stock Exchanges. Neither the China Stock returns are Granger caused by India Stock Exchange nor is the Indian Exchange is Granger Caused by China Stock Exchange.

Table 8
Result of Cointegration Test

JOHNSEN COINTEGRATION TEST				
Sample (adjusted): 7 946				
Included observations: 884 after adjustments				
Trend assumption: Linear deterministic trend				
Series: RETBZ RETIN RETSA RETCH RETRUS				
Lags interval (in first differences): 1 to 4				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.21551	887.8303	69.81889	0.0001
At most 1 *	0.190215	613.2643	47.85613	0.0001
At most 2 *	0.179559	486.7533	29.79707	0.0001
At most 3 *	0.165216	311.7982	15.49471	0.0001
At most 4 *	0.15813	152.1631	3.841466	0
Trace test indicates 5 cointegrating eqn(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 *	0.21551	274.5653	33.87687	0.0001
At most 1 *	0.190215	186.5116	27.58434	0.0001
At most 2 *	0.179559	174.9551	21.13162	0.0001
At most 3 *	0.165216	159.6351	14.2646	0.0001
At most 4 *	0.15813	152.1631	3.841466	0
Max-eigenvalue test indicates 5 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):				
RETBZ	RETIN	RETSA	RETCH	RETRUS
-85.01158	-39.43208	260.8707	36.5393	42.73627
-128.9378	105.1046	50.86313	41.44946	-103.2636
-79.55115	-103.8834	-112.3474	91.77437	140.9198
43.05112	158.9331	-132.9852	115.4973	-14.41794
-79.88624	139.993	-65.77137	-112.7967	105.0763
Unrestricted Adjustment Coefficients (alpha):				
D(RETBZ)	0.000321	0.005686	0.00234	-0.002174	0.001722
D(RETIN)	-0.001444	9.57E-05	0.002064	-0.003102	-0.00234
D(RETSA)	-0.004713	0.001531	0.001548	-8.74E-05	0.000281
D(RETCH)	-0.002232	-0.000663	-0.001674	-0.003653	0.002338
D(RETRUS)	-0.003505	0.004473	-0.002229	-0.001288	-0.00267

Comparing the critical values with the statistics, it can be interpreted that the BRICS nations Stock market is not co-integrated. If the statistics values are lesser than the critical values, it infers that there is a co-integration. In this case, all the statistics values are much higher than their respective critical values. It can be concluded that the BRICS stock markets are not co- integrated.

Conclusion

The Econometric analysis on thereturnsfromthestockexchangesinBrazil,Russia, India,China and South Africa namely– BM&FBOVESPAStockExchange,RSTStockExchange,NationalStock Exchange,ShanghaiStockExchange and Johannesburg stock Exchange(FTSE/JSE) is conducted.Inorderto checkthestationarity ofthe five series,thecorrelogramandtheUnitRootTestare performed.Wetestthe nullhypothesisat5%levelofsignificancefor whichtheprobabilityvalueoflessthan0.05impliesthatthenullhypothesiscanberejected. The Probability value of the hypothesis: RETRUS does not Granger Cause RETIN, RETSA does not Granger Cause RETIN, RETCH does not Granger Cause RETIN, RETIN does not Granger Cause RETCH, RETBZ does not Granger Cause RETIN is more than 0.05, which implies that null hypothesis cannot be rejected. Whereas the probability value of hypothesis: RETIN does not Granger Cause RETRUS, RETIN does not Granger Cause RETSA, RETIN does not Granger Cause RETBZ is lower than 0.05, which means the null hypothesis in can be rejected.

This implies that the return at Indian stock exchange Granger Cause the return at Russia, Brazil and South Africa stock Exchanges. Neither the China Stock returns are Granger caused by India Stock Exchange nor is the Indian Exchange is

Granger Caused by China Stock Exchange. The result of the co-integration test inferred that the stock Markets of the BRICS countries are not co-integrated.The presence of co-movements among national stock markets limits the benefit of internationaldiversification.

References

- Imran A,Kashif R, Kucuk Y A,KhanandHasan A(2010), "Causal Relationship between macroeconomicindicatorsand stockexchangepricesin Pakistan",African*Journal of BusinessManagement*, Vol.4(3),pg312-319,March
- BoseSand Dipankor, C(2004),"TheImpactofFIIRegulation sinIndia:ATime-SeriesInterventionAnalysisofEquityF lows"*Money &Finance*,IcraBulletin,Vol.2,No.18, pp54-83,July-December
- ChakrabartiR(2001),"FIIFlowstoIndi a:NatureandCauses",*MoneyandFina nce*,Indian School of Business,Vol.2, No. 7,October-December
- ingh S and Sharma GD(2012), Inter-LinkagesBetweenStock Exchanges: AStudyOfBRIC Nations,*International Journal Of Marketing, Financial Services &Management Research*, Vol.1No.3,March
- NeilManning 200, On thefirststage the some researcher the AsianstockexchangesCommon trendsandconvergence?SouthEastAsi anequity markets,1988–1999 JournalofInternational Moneyand Finance21 (2002)183–202
- SanjayRamchander,ReturnDynamics AcrosstheAsianEquityMarkets*Volu me29Number4,2003* International and Finance
- AamirR.Hashmi, InterlinkagesAmongSouth EastAsianStockMarkets(A Comparison Between Pre- and Post-1997-Crisis preand post crises period)
- KatePhylaktis,FabiolaRavazzoloStoc kmarketlinkagesinemerging markets:implicationsfor international portfolio diversification,Int.Fin. Markets,Inst.and Money,15(2005)91–106
- Yang, Jian, Kolari, J.W. and Min, Insik. (2003). 'Stock market integration and financialcrises: the case of Asia". *Applied Financial Economics, 13*, 477-486
- Ng, V., Chang, R. and Chou, R. (1990). An examination of the behavior of international stock market volatility. *Pacific-Basin Capital Market Research, II*.
- Palac-McMiken, Evanor. (1997),'An examination of ASEAN stock S markets: a cointegration approach'. *ASEAN Economic Bulletin, 13*(3), 299-311.
- Masih, Abul and Masih, Rumi (1999). 'Are Asian market fluctuations due mainly to intra-regional contagion effects? Evidence based on Asian emerging stock markets.'*Pacific Basin Finance Journal, 7*(3-4), 251-282.
- Jin, Dehuan. (2001). Significant price movements in the Chinese stock markets. Working paper, Shanghai

University of Finance and Economics.

- Johnson, Robert, and Soenen, Lue. (2002). Asian economic integration and stock market co-movement. *The Journal of Financial Research, 25*(1), 141-157.
- Kwan, A.C.C., A.B. Sim and J.A. Cotsomitis. (1995). The casual relationship between equity indices on world exchanges. *Applied Economics, 27*, 33-37.
- Gujarati, Damodar N. (2003). Basic Econometrics (Fourth Edition). McGraw-Hill.
- Cheung, Y.L. and Ho, Y.K. (1991). The inter-temporal stability of the relationships between the Asian emerging equity markets and the developed equity markets. *Journal of Business Finance & Accounting, 18*(2), 235-255.
- Cheung, Y.L. and Mak, S.C. (1992). A study of the international transmission of stock market fluctuation between the developed markets and Asian Pacific market. *AppliedFinancial Economics, 2*, 43-47.
- Cheung, Y.L. and Hung, B. (1995). Interdependence of Asian emerging equity markets.*Journal of Business Finance & Accounting, 22*(2), 281-288.
- Chowdhury, Abdur R. (1994). The behavior of closed-end country fund prices in the Asian NIEs. *Applied Economics Letters, 1*(12), 219-22.
- Chowdhury, Abdur. (1994). Stock market interdependencies: evidence from the Asian NIEs. *Journal of Macroeconomics, 16*(4), 629-651.
- Chan, K.C., Cup, B.E. and Pan, M.S. (1992). An empirical analysis of stock prices in major Asian markets and the United States. *The Financial Review, 27*, 289-307.
- Chaudhuri, K. (1997). Stock returns in emerging markets: a common trend analysis.*Applied Economics Letters, 4*(2), 105-108.

Websites Visited

- http://www.moneycontrol.com/
- https://in.finance.yahoo.com/
- http://www.theatlantic.com/business/archive/2012/02/the-world-in-2050
- http://www.bloomberg.com/markets/stocks/movers/bovespa/
- http://markets.ft.com/RESEARCH/Markets/tearsheets/summary?s=574715
- http://www.investing.com/equities/russia
- http://www.investing.com/indices/shanghai-composite
- http://in.investing.com/indices/s-p-cnx-nifty
- http://en.wikipedia.org/wiki/BRICS