Dynamic Interrelationship between Indices of BRICS Economies

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Abstract

*As equity markets developed, different categories of investors started participating in the market. **BRICS** is a grouping acronym that refers to the countries of Brazil, Russia, India, China& South Africa which are all deemed to be at a similar stage of newly advanced economic development. There is a lot of importance being associated with BRICS nations in the recent past saying that they are going to be the next super powers in the world markets by 2050 (Goldman Sachs Report). His paper examines the dependence structure between the emerging stock markets of the BRICS countries. The Study will use closing price of respective indexes of last year 2013 to check the normality and relationship that exist in BRICS Countries. This paper analyzes the dynamic interrelationship among the emerging countries specially BRICS countries in condition of financial turmoil. Popular Indices of BRICS countries have taken as the proxy of their Stock market. Several statistical tests have been applied in order to study the behavior and dynamics of time series of BRICS countries indices. The period for the study was taken from January to December 2013 using the daily closing points. These results have implications for international investors in terms of risk management which should vary according to changes in the economic and financial global factors.*

Keywords: *Equity, Correlation, BRICS, Indices, Volatility*

Introduction

Under globalization, world financial markets and economics are increasingly integrated due to free flow capital and international trade. Further, globalization has increased co-movement in stock prices across international markets. This co-movement stimulates vulnerability to market shocks. Therefore, shocks originating in one market not only affected its own market but are also transmitted to other equity markets. Hence, any information regarding the economic fundamentals of one country gets transmitted to other markets and thus affects the other's stock markets. There are differing views concerning how correlation of international stock markets changes over a period of time. One view is that correlations across international stock markets are not constant over time due to changes in economics, political and market environments among countries. With the possible exception of Russia, the BRICS members are all developing or newly industrialized countries, but they are distinguished by their large, fast-growing economies and significant influence on regional and global affairs. BRICS is a unique Grouping with shared opportunities and common challenges. The general consensus is that the term was first prominently used in a Goldman Sachs report from 2003, which speculated that by 2050 these five economies would be wealthier than most of the current major economic powers. The combined territories of the BRICS countries account for nearly 30 percent of the world's total land area and they are home to 42 percent of the world's total residents. In 2010, the group contributed 18 percent of the world's GDP and 15 percent of global trade. BRICS is playing an increasingly important role in world economy. From 2001 to 2010, inter-BRICS trade shot up with an average annual growth rate of 28 percent. Total trade among the five countries stood at 230 billion U.S. Dollars in 2010.

Review of Literature

Chaudhuri (1997) used the Engle-Granger co integration and Granger causality test to examine the relation among six Latin American countries for the period of 1985 -1993 and found a long run relationship between them. In addition, they found a significant causal relationship in both directions. Chen *et al*. (2002) examined the relationship between six Latin American countries including Argentina and Brazil, and employed the error correction VAR technique using daily returns from 1995 - 2000 and argued that the diversification benefit in different Latin American markets was limited.

Husain and Saidi (2000) investigated the interdependence of the equity market in Pakistan with seven major equity markets of UK,USA, France, Japan,

Table 1: Sample and Data Source

Country	Name of the Stock Exchange	Index	Symbol	Launch date	Constituents	Data Source
Brazil	BM&FBOVESPA (BVMF)	Ibovespa	BI	1968	68	www.investing.com
Russia	MICEX – RTS	RTS Index	RTS	1997	30	www.investing.com
India	National Stock Exchange	S & P CNX Nifty	NSE	1991	50	www.investing.com
China	Shanghai Stock Exchange	Shanghai Composite	SC	1990	50	www.investing.com
South Africa	Johannesburg Stock Exchange	Top 40 Index	JSE/FTSE	2002	42	www.investing.com

Germany, Singapore and Hong Kong. The integration was examined through Engle and Granger co integration technique using weekly stock price indices from January 1988 to December 1993. The analysis revealed little support of integration of the Pakistani equity market with selected international markets. This made Pakistan equity market as an attractive tool diversification for international investors.

Aktan *et al.* (2009) examined the linkages among the stock markets of the BRICA countries (Brazil, China, Russia, India and Argentina) and their relations with the US stock market on daily data from January 2002 to February 2009. They employed the vector auto regression techniques which showed the significant effect of US market on all BRICA countries in the same trading day.

Bhar and Nikolova (2009) who explored the level of co integration of the BRIC with their respective Regions and the world in the post-liberalization period has found that India has the highest level of Integration on a regional and world level amongst the BRIC countries followed by Brazil, Russia and lastly China. The study also suggested the existence of diversification opportunities for China, given its closed nature of the financial system.

Aktar (2009) used JJ co integration, Vector Error Correction Model, Granger Causality test to examine the co movement of stock prices among the markets of Turkey, Russia and Hungary using the daily data from January 2000 to October 2008.The findings demonstrated that co integration existed among stock indices of countries. Furthermore, Granger Causality test revealed that there was bidirectional causality for the Turkish and Russian stock indices, whereas, Hungarian stock market Granger cause to Turkish stock market but not vice versa.

Aloui *et al.* (2011) who also evaluate on the co-movements between the BRIC markets and the US during the period of the global financial crisis indicate that dependency on the US is higher and more persistent to Brazil-Russia than for China- India. In their study, the author paired Brazil and Russia- countries which are highly dependent on commodity prices and China-India whose economic growth is largely influenced by finished-products export-price level. The authors who utilize copula functions in their study also revealed the high level of dependence persistence for all market pairs during both bullish and bearish markets.

Research Methodology

There is a need to study cross border interrelation among international stock markets. The correlation and volatility transmission between stock markets is important for risk managers and policy makers for the following reasons. The correlation of stock markets is useful to design a well-diversified portfolio for investors. Changes in international correlation patterns call for an adjustment of portfolios. Policy makers are interested in volatility transmission across markets because of its implications for the stability of the global financial system.

Objective of the Study

- To give a good theoretical approach to Equity Market of BRICS Countries.
- To check the normality in the indices of BRICS Countries
- To find out that which country has highest Stock Prices correlation with the India among other countries in BRICS.

Research design of study is exploratory & analytical. Shapiro Wilks W Test has been used for the testing normality of data. Pearson's Coefficient Correlation by using SPSS is used to determine the Correlation among BRICS. The present study is directed towards studying the dynamics among the stock market of BRICS countries. Daily Closing Prices of Indices are taken for the research purpose. The time span for the study is taken from January 2013 to December 2013.

Data Analysis and Interpretation

Table 2 presents the descriptive statistics for the daily stock return of BRICS markets. It is very clear from the Table 2 that Brazil exhibits the highest average daily return across all markets and highest variability among the five markets as measured by the standard deviation of returns.

Table 2 Statistics for the Daily Stock Return of BRICS Markets

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
Ibovespa	250	45044.03	63312.46	53655.1898	4017.53083	16140553.976
RTS Index	251	1233.04	1635.50	1425.5847	97.37728	9482.334
Nifty	248	5285.00	6363.90	5913.5149	226.41714	51264.723
SC Index	238	1950.01	2434.48	2191.6993	111.01213	12323.693
Top 40	250	33230.97	41482.39	37206.7186	2081.63257	4333194.163
Valid N (list wise)	238					

Table 3 Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Ibovespa	238	94.8%	13	5.2%	251	100.0%
RTS Index	238	94.8%	13	5.2%	251	100.0%
Nifty	238	94.8%	13	5.2%	251	100.0%
SC Index	238	94.8%	13	5.2%	251	100.0%
Top40	238	94.8%	13	5.2%	251	100.0%

Table 4 Tests of Normality (Lilliefors Significance Correction)

	Kolmogorov- Smirnov[a]			Shapiro- Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Ibovespa	.059	238	.041	.990	238	.099
RTS Index	.056	238	.070	.978	238	.001
Nifty	.064	238	.020	.980	238	.002
SC Index	.064	238	.018	.985	238	.014
Top40	.144	238	.000	.950	238	.000

Table 5 Correlations Matrix

		Ibovespa	RTS Index	Nifty	SC Index	Top40
Ibovespa	Pearson Correlation	1	.844[**]	.172[**]	.769[**]	-.164[**]
	Sig. (2-tailed)		.000	.007	.000	.009
	N	250	250	248	238	250
RTS Index	Pearson Correlation	.844[**]	1	.388[**]	.593[**]	.042
	Sig. (2-tailed)	.000		.000	.000	.509
	N	250	251	248	238	250
Nifty	Pearson Correlation	.172[**]	.388[**]	1	.163[*]	.432[**]
	Sig. (2-tailed)	.007	.000		.012	.000
	N	248	248	248	238	248
SC Index	Pearson Correlation	.769[**]	.593[**]	.163[*]	1	-.219[**]
	Sig. (2-tailed)	.000	.000	.012		.001
	N	238	238	238	238	238
Top40	Pearson Correlation	-.164[**]	.042	.432[**]	-.219[**]	1
	Sig. (2-tailed)	.009	.509	.000	.001	
	N	250	250	248	238	250

** Correlation is significant at the 0.01 level (2-tailed).
*Correlation is significant at the 0.05 level (2-tailed).

Table 3 summarizes the analysis dataset in terms of valid and excluded cases. The reasons why SPSS might exclude an observation from the analysis are listed here, and the number ("N") and percent of cases falling into each category (valid or one of the exclusions) are presented. In this Study, 238 in all of the observations in the dataset are valid.

The Kolmogorov– Smirnov test can be modified to serve as a goodness of fit test. In the special case of testing for normality of the distribution, samples are

standardized and compared with a standard normal distribution. This is equivalent to setting the mean and variance of the reference distribution equal to the sample estimates, and it is known that using these to define the specific reference distribution changes the null distribution of the test statistic. Various studies have found that, even in this corrected form, the test is less powerful for testing normality than the Shapiro- Wilk test. The Shapiro- Wilk Test is more appropriate for small sample sizes (< 50 samples), but can also handle sample sizes as large as 2000. For this reason, we will use the Shapiro- Wilk test as our numerical means of assessing normality. The null-hypothesis of this test is that the population is normally distributed. Thus if the p-value is less than the chosen alpha level, then the null hypothesis is rejected and there is evidence that the data tested are not from a normally distributed population. In other words, the data is not normal. On the contrary, if the p-value is greater than the chosen alpha level, then the null hypothesis that the data came from a normally distributed population cannot be rejected. For the above objective, it is concluded that for an alpha level of 0.05, the data are not from a normally distributed population except Brazil. For Brazil for an alpha level of 0.05, a data set with a p-value of 0.99 does not result in rejection of the hypothesis that the data are from a normally distributed population. Hence the Prices of Brazil are normally distributed while in case of other countries Russia, India, China and South Africa, it is concluded that P value is less than the alpha value which shows that the prices of these respective indices are not normally distributed.

Correlation test can be seen as the indication of interrelationship between BRICS countries stock return. Table 5 shows the correlation matrix. From the SPSS obtained statistics it is observed that there is positive correlation between all these countries except there is negative correlation with the indices of South Africa with Brazil and China. Brazil statistic shows its interdependency with Russia (.844) is stronger than India (.172) and China (.769). Similarly India is also having strong interdependency with South Africa (.432) as compare to the Russia (.388), Brazil (0.172) and China (0.163). Russia having a strong interdependency with Brazil and China as compare to India and South Africa. China is more influenced by the Brazil and Russia economy as compare with India and South Africa. South Africa shows its higher interdependency with India as compare to Russia while negatively correlated with Brazil and China.

Conclusions

Interlink ages between developed and emerging stock markets has great importance because strong linkage reduces insulation of domestic market from any global shock and creates implications, whereas weak market linkage offers potential gains from international diversifications and affects development of the emerging markets. To check the prices of Indices are normally distributed, if the p-value is less than the chosen alpha level, then concludes the data are not from a normally distributed population. To find out the correlation among the BRICS countries time series correlation test was done. Russia having a strong interdependency with Brazil and China as compare to India and South Africa. China is more influenced by the Brazil and Russia economy as compare with India and South Africa. South Africa shows its higher interdependency with India as compare to Russia while negatively correlated with Brazil and China.

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