

## **Dynamic Inter-Linkages among BRICS Stock Markets during recent Demonetization in India**

---

**Dinesh K<sup>a</sup>, Dr. Janet Jyothi D'souza<sup>b</sup>**

<sup>a</sup>Research Scholar, Department of Management Studies, Ballari Institute of Technology & Management, Ballari (Karnataka), India.

<sup>b</sup>Associate Professor, Department of Management Studies, Ballari Institute of Technology & Management, Ballari (Karnataka), India.

## **Dynamic Inter-Linkages among BRICS Stock Markets during recent Demonetization in India**

---

### **Abstract**

The economic force of BRICS group can change the economic climate of the world if they are integrated financially. These interdependence among emerging stock markets from BRICS countries has an enormous importance in a globalized economic world. The primary objective of this paper is to examine the interaction between the four BRICS emerging countries stock market traded around the demonetization in India by considering daily closing prices of the benchmark indices of IBrX 50, RTSI, Nifty Index, Shanghai Composite Index, and FTSE - Africa Index for Brazil, Russia, India, China and South Africa are taken for a period of October 2015 to November 2016. We have been applied event study methodology to study the dynamic integration among selected emerging markets. Surprisingly, It has overall weak positive relationship exist among all the selected emerging markets and can found to be having inter-relationship among the stock market behavior. Finally, this paper benefits to the investors and policy makers for designing a well multi-national diversified stock market investments.

**Keywords:** Stock Market Inter-linkage, BRICS nations, Investment.

## **1) Introduction**

Harry Markowitz (1959) model suggests that investors choose a portfolio that will minimize the variance of portfolio return, given a specific level of expected return, or maximize expected return, given a specific level of variance. The Capital Asset Pricing Model (CAPM) was introduced by William Sharpe (1964) and John Lintner (1965). There exists a linear relationship between systematic risk and portfolio return. In this context, the market portfolio exists and consists of all risky assets traded in the market. The co-movement among the different markets concerned because a greater degree of co-movement between the countries under investment radars, reduces diversification benefits. Over a period of time, numerous researchers have tried to capture the long run co-movement among the emerging markets.

The BRIC countries were the constituent members of an acronym coined by Jim O'Neill, then of Goldman Sachs, in 2001. Mr O'Neill was looking for a way to convey the fact that China. There was just one problem with the BRICs: no African countries were included. Overlooking Africa suggested that the continent was an economic irrelevance. In 2010, the club of BRICs became the BRICS after South Africa joined the important bloc of emerging economies in December 2010 to strengthen relationship.

The five BRICS countries are among the most populous countries in the world. Together they make up over 40 percent of the world's population. The BRICS group as representatives of emerging countries in the global economy. It is worth noting that the financial crisis had no strong effect on the BRICS group and it had a much better economic performance than developed countries. The main factors that led to the economic expansion of the group were an increased input of factors, and enormous scales of population and resources. For example, Brazil and Russia are mainly based on huge reserves of mineral resources and speculations made in international markets. China has an advantage of cheap labor and resources at low prices. India is also based on low-cost workforce.

On November 8, 2016, the Indian government decisions that selected currency notes which represent 86 percent of the currency then in circulation would no longer be legal tender. The stated reason for this sudden "demonetization" was to combat tax evasion and corruption associated with "unaccounted for" cash. Ever since the announcement was made, there have been mixed reactions to it.

However, the present study prompted us to explore the reaction of BRICS countries stock markets during the episode of Indian government decision of Demonetization of selected currencies, an attempt has been made to find out any relationship between the respective equity markets of these emerging countries.

## **2) Literature Review**

The integration, inter-relationships and inter-dependencies, and dynamic linkages of emerging stock markets across the world are a widely-researched subject. But, the subject of the paper here is the inter dependence of various stock markets across the emerging markets and how it will impact stock markets are covers the literature to identifying the new area of research gap.

Sharma et al. (2013) studied the interdependence between Brazil, Russia, India, China, and South Africa (BRICS) stock markets with the help of benchmark indices of their stock exchanges. The study exposed that the BRICS stock markets were influenced by each other, but not to a great size. Srikanth and Aparna (2012) examined that BSE-Sensex has a strong relationship with Hang Seng, NYSE and SSE Composite Index and a poor addition with NASDAQ and Nikkei225. Gupta (2011) analyzed the dynamic relationship among the emerging countries stock markets and found BRIC countries in situation of financial turmoil. An and Brown (2010) examined the co-integration of the weekly and monthly index returns of the US, Brazil, Russia, India, and China stock markets. Their results indicated that there is some co-integration between China and US, while there is no co-integration between the USA and the other emerging markets. Singh and Sharma (2010) studied the interdependence between stock exchanges of BRIC nations and observed that the Indian stock exchange evident impact on the Brazilian stock markets and Russian stock markets but not the Chinese markets. Chittedi (2009) examine the linkages of the stock markets between the BRIC economies and their linkages with the developed countries stock markets such as the UK, USA using Johansens co-integration. The results discovered that the NIKKEI, SENSEX, BOVESPA and FTSE are significant. Brazil, and lastly China. Bora et al. (2009) examine the emerging market indexes of Brazil, Russia, India, China, and Argentina (BRICA) and investigate the linkage between the markets of the BRICA country and their inter-relations. The results showed that the USA market had a significant outcome on all BRICA countries in the similar trading day. Bhar and Nikolova (2009) examined the level of interdependence of the BRIC with their respective markets in the post-

liberalization period, and establish that India has the utmost level of interdependence on a markets and world level amongst the BRIC countries.

### **3) Objective of the study**

The main purpose of the study is

- ✓ To explore the reaction of stock market Index of BRICS countries during the episode of Indian government decision of Demonetization.
- ✓ To verify the impact of Demonetization announcement in India on its BRCS nations.
- ✓ To find the stock market trends based on the announcement effect using event study methodology.

### **4) Scope of the Study**

The present study aims to bring the inter-linkages among the selected stock markets of emerging markets includes Brazil, Russia, India, China and South Africa. The daily closing prices of the stock indices of the stock exchanges of the select countries are taken from 27/10/2015 to 24/11/2016 the data of closing prices are collected in their respective country currency and further the logarithmic returns are calculated. The major event considered under this study was Prime Minister Narendra Modi decision on 8th November 2016 announced the cancellation of Rs. 500 and 1000 rupees notes which resulted in affected 86% of the circulation of money being removed from the Indian economy overnight.. The study took the data period from 23<sup>rd</sup> October 2015 to November 8<sup>th</sup> 2016 consist of 240 days closing price return data and taking 8<sup>th</sup> November 2016 are Event day followed by November 8th to 23rd November 2016 .

### **Summary of sample of the BRICS Stock market Index understudy**

<b>No</b>	<b>Markets</b>	<b>Country</b>	<b>Major Index</b>	<b>Period from</b>	<b>Period to</b>	<b>Total no. of the observations</b>
1	Sao Paulo Stock Exchange	BRAZIL	IBOVESPA	27/10/2015	24/11/2016	252
2	Moscow Exchange	RUSSIA	MOEX RUSSIA INDEX	27/10/2015	24/11/2016	252
3	Bombay Stock Exchange	INDIA	S&P BSE SENSEX	27/10/2015	24/11/2016	252
4	Shanghai Stock Exchange	CHINA	SSE COMPOSITE INDEX	27/10/2015	24/11/2016	252

5	Johannesburg Stock Exchange	SOUTH AFRICA	FTSE/JSE AFRICA ALL SHARE INDEX	27/10/2015	24/11/2016	252
---	-----------------------------	--------------	---------------------------------	------------	------------	-----

### 5) Data collection and data source

The sample has been drawn from bseindia official website of of BSE 30 stocks companies' closing price from the period 23rd October 2015 to 23rd November 2016. The rest of other emerging stock market closing prices are collected from website of yahoo finance .The major event considered under this study was Prime Minister Narendra Modi decision on 8th November 2016 announced the cancellation of Rs. 500 and 1000 rupees notes how did the selected emerging markets react to the decision. The event window has been chosen as -10 day (23/11/2016) to +10 day (21/10/2016), where zero represents the demonetization date (8/11/2016) and -10, and +10 are the period before and after. The Independent variable is the BSE sensx index and rest of the selected global stock market index is taken to be dependent variable.

### 6) Research Methodology

Event study methodology is used to capture the impact of demonetization announcement on behavior of BSE sensx index and effect of index of other selected global stock market indices security returns , Brown & Warner (1980, 1985) While doing event study, The principle objective of an event study is to spot whether the performance of index returns of selected markets are statistically different from what is expected. Abnormal return for the index( $i$ ) and on the event date( $i$ ) is given by,

$$AR(it) = (ActualReturns - Expectedreturns)$$

Here,  $AR(it)$  represents abnormal return for selected index  $i$  for day  $t$  ,  $(Rit)$  represents actual return for selected index  $i$  for day  $t$  and  $Ex(r)$  represents the expected returns.

Abnormal return is based on statistical relationship like OLS Market Model, Market-Adjusted Return Model and Mean-Adjusted Return Model or models like Capital Asset Pricing Model . This study uses statistical relationship models to calculate abnormal return of securities.

the Average Abnormal Returns (AAR) is the average deviation of actual returns of a security from the expected returns. AAR is calculated for the purpose of improving the results of the analysis of abnormal returns; following equation is used to calculate the AAR

$$AAR = \frac{1}{N} \sum_{i=1}^N AR$$

Where,

- ✓  $AAR_t$  = average abnormal return for day t
- ✓ N= number of events in the sample

CAAR is used to make a generalization and draw an indication for stock price behavior /reaction to demonetization announcement. It is believed that AAR is not a powerful indicator to measure the overall impact therefore; CAARs are calculated during the event period to obtain overall impact. CAAR for event period of t-10(day-10) to t+10(day +10) is determined as follows

Calculation of Cumulative Average Abnormal Returns

$$CAAR(t_1, t_2) = \sum_{i=1}^N CAAR$$

Where,

- ✓  $CARR_t$ = cumulative average abnormal return up to day t
- ✓ T= number of days over which abnormal returns are cumulated
- ✓  $AAR_t$ = average abnormal return on day t

Significant Testing for AAR and CAARs .To test the significance of the AAR and the CARRs t-test is used at statistically significant at 5% level of confidence

**7) Data analysis and Discussion**

**Table 1: Computation of AR, CAR and t-test between Brazil return & BSE SENSEX.**

Table 1: Abnormal return between Brazil returns & BSE SENSEX							
Date	Brazil Index Return	SENSEX	Event Window	AR	t-test	CAR	t-test
10/21/2016	0.422	-0.187	-10	1.053	-1.119	1.053	11.587
10/24/2016	-0.075	0.362	-9	0.693	-0.736	1.746	19.212
10/25/2016	-0.303	-0.312	-8	0.297	-0.316	0.990	10.892
10/26/2016	-0.063	-0.912	-7	0.388	-0.413	0.685	7.541
10/27/2016	0.662	0.285	-6	1.411	-1.499	1.799	19.793
10/28/2016	0.090	0.092	-5	0.791	-0.840	2.202	24.221
11/1/2016	-1.539	-0.233	-4	-0.919	0.976	-0.128	-1.407
11/3/2016	-2.520	-1.614	-3	-2.244	2.384	-3.163	-34.793
11/4/2016	-0.246	-0.571	-2	0.289	-0.307	-1.955	-21.502
11/7/2016	3.907	0.675	-1	4.752	-5.050	5.042	55.465
11/8/2016	0.165	0.480	0	0.963	-1.023	5.715	62.872
11/9/2016	-1.413	-1.235	1	-1.042	1.107	-0.079	-0.874
11/10/2016	-3.306	0.968	2	-2.387	2.536	-3.429	-37.723
11/11/2016	-3.351	-2.572	3	-3.313	3.521	-5.700	-62.710
11/16/2016	2.626	-1.958	4	2.817	-2.993	-0.496	-5.461
11/17/2016	-1.641	-0.271	5	-1.031	1.095	1.786	19.652
11/18/2016	0.321	-0.295	6	0.925	-0.983	-0.106	-1.161
11/21/2016	1.831	-1.484	7	2.140	-2.274	3.065	33.715
11/22/2016	1.437	0.756	8	2.303	-2.447	4.443	48.876
11/23/2016	0.052	0.350	9	0.817	-0.868	3.120	34.321
11/24/2016	-0.956	-0.738	10	-0.462	0.491	0.354	3.898

The following table 1 shows abnormal return of Brazil stock index for each of the event day. On the event day(t=0), the Brazil Index is not statistically different from zero and the returns were positive. The event period for the before the event was having 8 times positive and 2 times negative return followed by after the event day it recorded 5 times positive and 5 times negative returns. The negative returns were recorded immediately on the day-1, day-2 and day-3 of the event day and it was found statistically significant on the day-2 and day-3 after the event also having CAAR of (-5.700) on the negative day-3. This implies that it has mixed response of both negative returns and positive return in equal weight age and it can be concluded that it has immediate negative effect next to the event day and significant with t-statistics at negative day-3.



**Table 2: Computation of AR, CAR and t-test between China return & BSE SENSEX.**

Table 2: Abnormal return between China returns & BSE SENSEX							
Date	China index Return	SENSEX	Event Window	AR	t-test	CAR	t-test
10/21/2016	0.0312	-0.187	-10	0.675	-0.857	0.675	7.605
10/24/2016	0.2597	0.362	-9	-0.675	0.857	0.000	-0.001
10/25/2016	0.7310	-0.312	-8	-1.531	1.945	-2.206	-24.864
10/26/2016	-0.1204	-0.912	-7	-0.683	0.868	-2.214	-24.959
10/27/2016	0.2524	0.285	-6	-0.892	1.134	-1.576	-17.761
10/28/2016	0.0989	0.092	-5	-0.178	0.226	-1.070	-12.065
11/1/2016	0.7596	-0.233	-4	-1.803	2.290	-1.980	-22.325
11/2/2016	-1.4172	-1.261	-3	0.032	-0.041	-1.771	-19.961
11/3/2016	-0.3083	-0.353	-2	-1.011	1.285	-0.979	-11.040
11/7/2016	-0.5118	0.105	-1	-0.145	0.184	-1.156	-13.030
11/8/2016	0.7774	0.480	0	-0.015	0.019	-0.160	-1.798
11/9/2016	2.1938	-1.235	1	-1.781	2.263	-1.796	-20.246
11/10/2016	1.6003	0.968	2	1.078	-1.369	-0.703	-7.928
11/11/2016	-0.5942	-2.572	3	-0.912	1.159	0.165	1.864
11/15/2016	-0.7340	-1.936	4	-1.096	1.392	-2.008	-22.638
11/16/2016	0.5863	-0.0231	5	-0.738	0.938	-1.834	-20.672
11/17/2016	0.6798	-0.271	6	-0.670	0.852	-1.409	-15.878
11/18/2016	-0.2191	-0.295	7	-1.274	1.618	-1.944	-21.914
11/21/2016	0.9997	-1.484	8	-0.469	0.596	-1.742	-19.642
11/22/2016	0.3593	0.756	9	0.566	-0.719	0.097	1.089
11/23/2016	0.9427	0.350	10	-0.752	0.956	-0.187	-2.105

The following table 2 shows abnormal return of Chinese stock index for each of the event day. On the event day(t=0), the Chinese Index is statistically different from zero and the returns were positive. The event period for the before the event was having 8 times positive and 2 times negative return followed by after the event day it recorded similar 8 times positive and 2 times negative returns. The positive returns were recorder immediately on the day-1, day-2 of the event day and it was found statistical significant on the day-1 and day-2 after the event also having CAAR of (5.169) on the negative day 2. This implies that it has Chinese Shanghai Stock Exchange has more of positive returns on the before and after the event day and it be concluded that it has immediate positive effect next to the event day and significant with t-statistics and had negative return only on day-3 and day-4 after the event.

**Table 3: Computation of AR, CAR and t-test between Russia return & BSE SENSEX.**

Table 3: Abnormal return between RUSSIA returns & BSE SENSEX							
Date	Russia Index	SENSEX	Event Window	AR	t-test	CAR	t-test
10/21/2016	0.031	-0.187	-10	0.678	-1.847	0.678	9.880
10/24/2016	0.260	0.362	-9	1.318	-3.590	1.996	29.084
10/25/2016	0.731	-0.312	-8	1.285	-3.500	2.603	37.926
10/26/2016	-0.120	-0.912	-7	-0.016	0.042	1.269	18.496
10/27/2016	0.252	0.285	-6	1.253	-3.412	1.237	18.026
10/28/2016	0.099	0.092	-5	0.955	-2.601	2.207	32.164
11/1/2016	0.760	-0.233	-4	1.373	-3.739	2.327	33.912
11/2/2016	-1.417	-1.261	-3	-1.574	4.288	-0.201	-2.934
11/3/2016	-0.308	-0.353	-2	0.215	-0.585	-1.359	-19.805
11/7/2016	-0.512	0.105	-1	0.354	-0.963	0.568	8.282
11/8/2016	0.777	0.480	0	1.924	-5.241	2.278	33.186
11/9/2016	2.194	-1.235	1	2.057	-5.603	3.981	58.002
11/10/2016	1.600	0.968	2	3.112	-8.477	5.169	75.315
11/11/2016	-0.594	-2.572	3	-1.732	4.719	1.380	20.103
11/15/2016	-0.734	-1.936	4	-1.396	3.802	-3.128	-45.581
11/16/2016	0.586	-0.023	5	1.356	-3.695	-0.039	-0.572
11/17/2016	0.680	-0.271	6	1.264	-3.444	2.621	38.189
11/18/2016	-0.219	-0.295	7	0.347	-0.945	1.611	23.479
11/21/2016	1.000	-1.484	8	0.677	-1.843	1.023	14.913
11/22/2016	0.359	0.756	9	1.713	-4.665	2.389	34.811
11/23/2016	0.943	0.350	10	1.992	-5.426	3.704	53.977

The following table 3 shows abnormal return of Russia stock index for each of the event day. On the event day(t=0), the Russia Index is statistically different from zero and the returns were positive. The event period for the before the event was having 8 times positive and 2 times negative return followed by after the event day it recorded similar 8 times positive and 2 times negative returns. The positive returns were recorder immediately on the day-1, day-2 of the event day but it was found statistical significant on the day-3 before and after the event day only and observed negative AR on day-3 and day-4, CAAR of (5.169) on the positive day-2. This implies that it has Moscow Exchange has more of positive returns on the before and after the event day and it be concluded that it has immediate positive effect next to the event day and significant with t-statistics and had negative return only on day-3 and day-4 after the event.

**Table 4: Computation of AR, CAR and t-test between South Africa return & BSE SENSEX.**

Table 4: Abnormal return between South Africa returns & BSE SENSEX							
Date	South Africa Index	SENSEX	Event Window	AR	t-test	CAR	t-test
10/24/2016	0.105	0.362	-10	-0.108	-0.114	-0.108	-1.573
10/25/2016	0.129	-0.312	-9	0.363	0.382	0.255	3.706
10/26/2016	-0.382	-0.912	-8	0.252	0.264	0.615	8.932
10/27/2016	-0.804	0.285	-7	-0.965	-1.013	-0.714	-10.367
10/28/2016	-0.671	0.092	-6	-0.704	-0.739	-1.669	-24.247
11/1/2016	0.403	-0.233	-5	0.585	0.614	-0.119	-1.728
11/2/2016	-1.219	-1.261	-4	-0.352	-0.370	0.233	3.383
11/3/2016	-0.289	-0.353	-3	-0.027	-0.028	-0.379	-5.508
11/4/2016	-1.107	-0.571	-2	-0.700	-0.735	-0.727	-10.556
11/7/2016	1.235	0.675	-1	0.814	0.855	0.114	1.659
11/8/2016	0.786	0.480	0	0.494	0.519	1.309	19.004
11/9/2016	0.545	-1.235	1	1.394	1.463	1.889	27.429
11/10/2016	1.005	0.968	2	0.389	0.409	1.783	25.902
11/11/2016	-2.355	-2.572	3	-0.616	-0.647	-0.227	-3.293
11/15/2016	-1.734	-1.936	4	-0.419	-0.439	-1.035	-15.027
11/16/2016	1.156	-0.023	5	1.199	1.258	0.780	11.327
11/17/2016	1.218	-0.271	6	1.426	1.497	2.624	38.113
11/18/2016	0.017	-0.295	7	0.241	0.253	1.667	24.206
11/21/2016	-0.058	-1.484	8	0.956	1.004	1.197	17.386
11/22/2016	1.025	0.756	9	0.550	0.577	1.506	21.867
11/23/2016	-0.986	0.350	10	-1.191	-1.250	-0.641	-9.309

The following table 4 shows abnormal return of South Africa stock index for each of the event day. On the event day(t=0), the South Africa Stock Index is not statistically different from zero and the returns were positive .The event period for the before the event was having 4 times positive and 6 times negative return followed by after the event day it recorded 7 times positive and 3 times negative returns .The positive returns were recorder immediately on the day-1 ,day-2 of the event day but it was found statistical insignificant for all the days for before and after the event day and observed negative AR on day-3 and day-4 ,CAAR of (1.497) on the negative day-6. This implies that it has Johannesburg Stock Exchange has week of positive returns on the before and after the event day and it be concluded that it has immediate positive returns (1.394) and found statistically insignificant on the returns.

**Table 5: Computation of AAR and t-test results**

Table 5: Calculation of Average Abnormal returns & t test value										
Window	AR (Brazil)	AR(China)	AR(Russia)	AR(SA)	Ave returns	N	AAR	Std Dev	Std Error	t-test value
-10	1.053	0.675	0.678	-0.108	0.574	4	0.574	0.489	0.244	2.351
-9	0.693	-0.675	1.318	0.363	0.425	4	0.425	0.833	0.417	1.020
-8	0.297	-1.531	1.285	0.252	0.076	4	0.076	1.172	0.586	0.129
-7	0.388	-0.683	-0.016	-0.965	-0.319	4	-0.319	0.617	0.309	-1.033
-6	1.411	-0.892	1.253	-0.704	0.267	4	0.267	1.234	0.617	0.432
-5	0.791	-0.178	0.955	0.585	0.538	4	0.538	0.501	0.250	2.150
-4	-0.919	-1.803	1.373	-0.352	-0.425	4	-0.425	1.339	0.670	-0.635
-3	-2.244	0.032	-1.574	-0.027	-0.953	4	-0.953	1.137	0.569	-1.676
-2	0.289	-1.011	0.215	-0.700	-0.302	4	-0.302	0.653	0.326	-0.924
-1	4.752	-0.145	0.354	0.814	1.444	4	1.444	2.240	1.120	1.289
0	0.963	-0.015	1.924	0.494	0.842	4	0.842	0.825	0.412	2.041
1	-1.042	-1.781	2.057	1.394	0.157	4	0.157	1.856	0.928	0.169
2	-2.387	1.078	3.112	0.389	0.548	4	0.548	2.273	1.136	0.482
3	-3.313	-0.912	-1.732	-0.616	-1.644	4	-1.644	1.209	0.605	-2.718
4	2.817	-1.096	-1.396	-0.419	-0.023	4	-0.023	1.937	0.969	-0.024
5	-1.031	-0.738	1.356	1.199	0.197	4	0.197	1.256	0.628	0.313
6	0.925	-0.670	1.264	1.426	0.736	4	0.736	0.961	0.480	1.533
7	2.140	-1.274	0.347	0.241	0.364	4	0.364	1.396	0.698	0.521
8	2.303	-0.469	0.677	0.956	0.867	4	0.867	1.139	0.569	1.522
9	0.817	0.566	1.713	0.550	0.911	4	0.911	0.548	0.274	3.324
10	-0.462	-0.752	1.992	-1.191	-0.103	4	-0.103	1.428	0.714	-0.145

The following table shows average abnormal return for Brazil, China , Russia and South Africa stock index for each of the event day. We observe that ,on the event day(t-0), the AAR found to be positive return (0.842) and is statistically different from zero .The event period for the before the event was having 6 times positive and 4 times negative return followed by after the event day it recorded 7 times positive and 3 times negative returns .The positive returns were recorder immediately on the day-1 ,day-2 of the event day but it was found statistical significant only on the day-9 for after and before on day-10 from the event day and observed negative AAR on day-3 and day-4 and day-10.

### 8) Conclusion

It implies that, the average abnormal returns are positive but not significant on the before and after the event day and hence we can say that overall emerging market are weak positively inter linked to the Indian stock market on the event of Demonetization decision on 8<sup>th</sup> November 2016.

### **9) Reference**

- 1) An, L., & Brown, D. (2010). Equity market integration between the US and BRIC countries: Evidence from unit root and cointegration test. *Research Journal of International Studies*, 16, 15-24.
- 2) Bodla, B. S., & Turan, M. S. (2006). Interlinkage dynamics of Asian stock markets. *PU Management Review*, 16(1), 20-34.
- 3) Bora, A., Mandaci, P. E., Kopurlu, B. S., & Ersener, B. (2009). Behaviour of Emerging Stock Markets in the Global Financial Meltdown: Evidence from BRICA. *African Journal of Business Management*, 3(7), 396-404.
- 4) Bose, S., & Mukherjee, P. (2006). A study of interlinkages between the Indian stock market and some other emerging and developed markets. In *Indian Institute of Capital Markets 9th Capital Markets Conference Paper*.
- 5) Boubaker, H., & Raza, S. A. (2016). On the dynamic dependence and asymmetric co-movement between the US and Central and Eastern European transition markets. *Physica A: Statistical Mechanics and its Applications*, 459, 9-23.
- 6) Chittedi, K. R. (2010). Global stock markets development and integration: With special reference to BRIC countries. *International Review of Applied Financial Issues and Economics*, (1), 18-36.
- 7) Dasgupta, R. (2014). Integration and dynamic linkages of the Indian stock market with BRIC-an empirical study. *Asian Economic and Financial Review*, 4(6), 715.
- 8) Fama, E. F., & French, K. R. (2004). The capital asset pricing model: Theory and evidence. *Journal of economic perspectives*, 18(3), 25-46.
- 9) Fama, E. F., & French, K. R. (2004). The capital asset pricing model: Theory and evidence. *Journal of economic perspectives*, 18(3), 25-46.
- 10) Gupta, S. (2011). Study of BRIC countries in the financial turmoil. *International Affairs and Global Strategy*, 1(1), 1-15.
- 11) Jeyanthi, Q. (2010). Who moves BRIC stock markets: US or Japan. *Journal of Applied Finance*, 16(5), 61-71.
- 12) Kanas, A. (1998). Linkages between the US and European equity markets: further evidence from cointegration tests. *Applied Financial Economics*, 8(6), 607-614.
- 13) Kaur, P., & Singh, A. (2015). Investigating the Leverage Effect and Volatility in the BRIC Countries' Equity Markets After the U.S. Financial Crisis. *The Journal of Wealth Management*, 17, 100 - 93.
- 14) Kishor, N., & Singh, R. (2017). Contagion Effect among the BRICS Stock Market Indices. *Journal of Poverty, Investment and Development*, 31.
- 15) Kishor, N., & Singh, R. P. (2014). Stock return volatility effect: Study of BRICS. *Transnational Corporations Review*, 6(4), 406-418.
- 16) Li, Y. W., Ho, A., & Yau, P. (2015). A Study on Stock Markets of Developing Countries' Integration & Relevance with Developed Countries' Stock Markets. *Scholedge International Journal of Management & Development*, 2(6), 61-71.
- 17) Lingaraja, K., Selvam, M., & Vasanth, V. (2014). Co movements and inter-linkages among emerging and developed stock markets in Asia with reference to Singapore stock exchange. *International Research Journal of Finance and Economics*, 122, 102-120.
- 18) Maheta, D. (2016). Integration Among BRICS Countries Stock Markets: Evidence from Co-integration Analysis. *Sankalpa*, 6(1), 1.

- 19) Markowitz, H. (1959). Portfolio selection. *Investment under Uncertainty*.
- 20) Mayur, M. (2017). Relationship between global stock exchanges and Indian stock market. *Asian Journal of Empirical Research*, 7(2), 28-41.
- 21) Mukherjee, D., Nath, K., & Mishra, R. K. (2005). Stock market interlinkages: A study of Indian and world equity markets. *Indian Journal of Commerce*, 58(1).
- 22) O'Neill, J. (2001). Building better global economic BRICs.
- 23) O'Neill, J. (2011). The growth map: Economic opportunity in the BRICs and beyond. Penguin UK.
- 24) Pandya, F. H. (2016). Are Stock Markets Interdependent? An Empirical Study of Selected Market Indices. *International Journal of Financial Management*, 6(3), 57-67.
- 25) Rajkumar, G. (2015). Linkages between india and three asean stock markets: a co-integration approach. *Journal of Commerce and Accounting Research*, 4(1).
- 26) Sharma, G. D., Mahendru, M., & Singh, S. (2013). Are the stock exchanges of emerging economies inter-linked: Evidence from BRICS. *Indian Journal of Finance*, 7(1).
- 27) Sharma, G. D., Singh, S., & Litt, G. S. (2011). Inter-linkages between Stock exchanges: A study of BRIC Nations. Available at SSRN 1837223.
- 28) Sharpe, W. F. (1964). Capital asset prices: A theory of market equilibrium under conditions of risk. *The journal of finance*, 19(3), 425-442.
- 29) Singh, A., & Kaur, P. (2015). Stock market linkages: Evidence from the US, China and India during the subprime crisis. *Timisoara Journal of Economics and Business*, 8(1), 137-162.
- 30) Singh, A., & Kaur, P. (2016). Do BRIC Countries' Equity Markets Co-Move in Long Run?. *Theoretical Economics Letters*, 6(02), 119.
- 31) Singh, G. S. P., & Singh, P. (2010). Chinese and Indian stock market linkages with developed stock markets. *Asian Journal of Finance & Accounting*, 2(2), E2.
- 32) Singh, K., Sengupta, S., & Vaish, A. (2019). Overreaction and Availability Bias: Analysis of Real Estate Sector's Stock Prices and Investors' Reaction during Demonetisation in India. *Journal of Modern Accounting and Auditing*, 15(5), 232-240.
- 33) Tripathi, V., & Sethi, S. (2010). Integration of Indian stock market with World stock markets. *Asian Journal of Business and Accounting*, 3(1), 117-134.
- 34) Tsutsui, Y., & Hirayama, K. (2004). Are international portfolio adjustments a cause of comovements in stock prices?. *Pacific-Basin Finance Journal*, 12(4), 463-478.
- 35) Zhang, Q., & Jaffry, S. (2015). Global financial crisis effects on volatility spillover between Mainland China and Hong Kong stock markets. *Investment management & financial innovations*, 12, 26-34.