RUN TEST ANALYSIS ON INDICES AND CAPITALISATION WITH REFERENCE TO BSE SENSEX FOR THE PERIOD OF TEN YEARS FROM 2007 TO 2016

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ABSTRACT

This paper postulates mainly on the randomness of index movements for a period of decennial. In this, the researchers make an attempt to study the number of trading days in the connection of events that are influence the stock exchanges. It is necessary to identify the steadiness of exchange which is useful for the perspective of investor. The researchers tried to make it easy to present the month, quarter and year wise analysis for better understanding of the market movements over a period of time. It is an attempt to analyse the comparative change in index movement and its connection to capitalisation for the selected periods. This empirical study will evidence that closing indices may follow random walk on a stipulated probability parameter

Keywords: Run Test, SENSEX, Capitalisation, Random Walk.

INTRODUCTION:

The growth of the equity market in India has been phenomenal in the present decade. Right from early nineties, the stock market witnessed heightened activity in terms of various bull and bear runs. One can identify the booms and busts of the Indian equity market through S&P BSE SENSEX. As the oldest index in the country, it provides the time series data over a fairly long period of time. The S&P BSE SENSEX has become one of the most prominent brands in the country.

LITERATURE REVIEW:

Sharma and Kennedy (1977)[10], compared the behavior of stock indices of the Bombay, London and New York stock exchanges during 1963-73 using run test and spectral analysis. Both runs test and spectral analysis confirmed the random movement of stock indices for all the three stock exchanges. They concluded that stocks on the BSE (Bombay Stock Exchange) follow random walk and are weak-form efficient. Poshakwale, Sunil (2002)[6] examined the random walk hypothesis in the emerging Indian stock market by testing for the nonlinear dependence using a large disaggregated daily data from the Indian stock market. Aggarwal (2012)[1] emphasized that Indian markets were random and successive index value changes were independent. The past index changes do not help the investor or analyst to forecast the future. Karemera et al. (1999)[3] examined the random walk hypothesis for fifteen emerging stock markets using multiple variance ratio tests and run test. Their results supported the evidence provide by Urrutia (1995)[11] who found Argentina, Brazil and Mexico to be weak form efficient. Asma Mobareka (2014)[2], has examined the weak form efficient market in the equity markets of Brazil, Russia, India and China for the time period of September 1995 - March 2010. The conclusion followed by Serial correlation test, Run test and Variance Ratio test states that these markets experienced significant positive autocorrelation in returns. Period results for the BRICs clearly provide support that these markets may have been approaching a state of being fairly weak - form efficient. Poshakwale, (1996)[5] Provided empirical evidence on weak form efficiency and the day of the week effect in Bombay Stock Exchange over a period of 1987 - 1994. The results provide evidence of day of the week effect and that the stock market is not weak form efficient. The results of runs test and serial correlation coefficients tests indicate nonrandom nature of the series and, therefore, violation of weak form efficiency in the BSE. S. K. Chaudhuri (1991)[8], Study indicates that market does not seem to be efficient even in its weak form. Rengasamy Elango, Mohammed Ibrahim Hussein (2007)[7], Analysis of the daily stock index returns of markets indicates that there are larger variations in returns during the study period and the markets are not efficient in the weak-form. Saif Sadiqui and P. K. Gupta (2010)[9], The results of both indices suggest do not exhibit weak form efficiency. Kashif Hamid, Muhammad T.S., Syad Z.A., Rana S., (2010)[4] Study indicates that no market is weak form efficient among all markets.

OBJECTIVES:

- To analyse the randomness of index movements of the BSE SENSEX from 2007 to 2016.
- To know the change of impact of index over market capitalisation.
- To verify the investors' estimation matched with interpreted results.

METHODOLOGY:

A run (Z) is defined as a series of increasing values or a series of decreasing values. The number of increasing, or decreasing, values is the length of the run. In a random data set, the probability that the $(I+1)^{th}$ value is larger or smaller than the I^{th} value follows a binomial distribution, which forms the basis of the runs test.

$$\boldsymbol{Z = \frac{R - \overline{X}}{\sigma}}$$

Where R is the observed number of runs, $\overline{X}$, is the expected number of runs, n1 & n0 are the number of observations in each category, and σ is the standard deviation of the number of runs. The values of $\overline{X}$ and σ are computed as follows:

$$\overline{X} = \frac{(2n1n0)}{(n1 + n0)} + 1$$

$$\sigma = \sqrt{\frac{2n1n0(2n1n0 - n1 - n0)}{(n1 + n0)^2 (n1 + n0 - 1)}}$$

ANALYSIS AND INTERPRETATION:

Table 1: Expected Number of Runs ($\overline{X}$)

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Q1	30.490	31.098	29.690	30.424	31.492	31.159	31.295	29.387	31.492	30.967
Q2	29.656	30.867	29.448	31.484	30.836	31.710	31.710	30.424	30.967	31.098
Q3	29.000	32.302	31.540	32.219	30.419	31.871	31.710	31.194	32.429	31.295
Q4	32.000	29.448	30.967	32.492	29.068	30.867	31.492	29.070	30.867	30.836

Source: Compiled and Calculated from www.bseindia.com

Table 2: Standard Deviation (σ)

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Q1	3.806	3.821	3.733	3.797	3.871	3.766	3.846	3.570	3.871	3.836
Q2	3.634	3.823	3.701	3.839	3.787	3.867	3.867	3.797	3.836	3.821
Q3	3.492	3.911	3.815	3.870	3.702	3.888	3.867	3.801	3.927	3.846
Q4	3.905	3.701	3.836	3.935	3.619	3.823	3.871	3.684	3.823	3.787

Source: Compiled and Calculated from www.bseindia.com

Table 3: Z-Value

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Q1	0.134	(0.287)	0.887	(0.638)	(1.160)	(0.042)	(0.597)	(0.108)	(2.452)	(0.513)
Q2	0.370	0.296	0.149	(0.126)	(1.013)	(0.184)	0.334	(0.375)	0.009	(0.026)
Q3	0.573	(0.844)	(0.666)	1.236	(0.113)	(0.738)	(1.476)	(1.629)	0.145	0.443
Q4	(1.793)	(1.472)	1.052	1.145	0.258	0.820	(2.193)	(0.562)	(0.488)	1.100

Source: Compiled and Calculated from www.bseindia.com

Table 4: Year wise Mean, SD and Z value

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Mean	122.39	122.22	120.60	125.62	120.75	124.43	125.34	119.37	124.45	123.93
SD	7.69	7.73	7.67	7.85	7.62	7.79	7.86	7.58	7.84	7.82
Z Value	(0.70)	(1.06)	0.57	0.69	(0.89)	(0.06)	(2.08)	(1.63)	(1.46)	0.14

Source: Compiled and Calculated from www.bseindia.com

By observing the Z values Quarter-wise there are twenty-four negative observations out of total 40. In the year 2013 Q4 (2.193) and 2015 Q1 (2.452) having occurrence of runs is less which results that the run test may not be success because the mean and SD values are nearby similar. Hence, the remaining observations are all lies on normal distribution curve. So, the occurrence of runs is more by chance.

By observing the Z values Year-wise there are seven negative observations out of total 10. In the year 2013 (2.08) having occurrence of runs is less which results that the run test may not be success. Hence, the remaining observations are all lies on normal distribution curve. So, the occurrence of runs is more by chance.

Table 5: Percentage Change in Index

Month	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Jan	NIL	(13.00)	(2.31)	(6.34)	(10.64)	11.25	2.41	(3.10)	6.12	(4.77)
Feb	(8.18)	(0.40)	(5.65)	0.44	(2.75)	3.25	(5.19)	2.96	0.61	(7.51)
Mar	1.04	(11.00)	9.19	6.68	9.10	(1.96)	(0.14)	5.99	(4.78)	10.17
Apr	6.12	10.50	17.46	0.18	(1.59)	(0.49)	3.55	0.14	(3.38)	1.04
May	4.84	(5.04)	28.26	(3.50)	(3.31)	(6.35)	1.31	8.03	3.03	4.14
Jun	0.73	(17.99)	(0.90)	4.46	1.85	7.47	(1.84)	4.94	(0.17)	1.24
Jul	6.15	6.64	8.12	0.95	(3.44)	(1.11)	(0.26)	1.89	1.20	3.90
Aug	(1.49)	1.45	(0.02)	0.58	(8.36)	1.12	(3.75)	2.87	(6.51)	1.43
Sep	12.88	(11.70)	9.32	11.67	(1.34)	7.65	4.08	(0.03)	(0.49)	(2.06)
Oct	14.73	(23.89)	(7.18)	(0.18)	7.60	(1.37)	9.21	4.64	1.92	0.23
Nov	(2.39)	(7.10)	6.48	(2.55)	(8.93)	4.51	(1.76)	2.97	(1.92)	(4.57)
Dec	4.77	6.10	3.18	5.06	(4.15)	0.45	1.82	(4.16)	(0.11)	(0.10)

Source: Compiled and Calculated from www.bseindia.com

Table 6: Percentage Change in Capitalisation

Month	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Jan	NIL	(12.26)	(1.20)	(6.10)	(10.58)	11.20	2.43	(3.19)	6.00	(4.77)
Feb	(8.46)	(0.15)	0.85	0.16	(2.34)	3.94	(5.17)	3.52	2.39	(7.51)
Mar	1.13	(10.94)	2.02	7.50	9.11	(2.82)	0.26	5.87	(9.81)	10.20
Apr	6.30	10.51	17.46	0.37	(1.52)	(0.18)	3.60	0.38	(2.73)	1.04
May	5.01	0.00	29.35	(1.05)	82.51	(5.76)	1.25	8.91	3.88	4.10
Jun	0.82	(22.21)	0.13	4.64	1.46	6.91	(1.81)	4.98	1.26	0.00
Jul	9.04	9.12	8.12	0.98	(3.21)	(1.38)	0.00	1.91	1.12	6.29
Aug	(1.55)	1.82	0.18	0.60	1.53	0.72	(4.29)	3.32	(6.44)	1.42
Sep	13.81	(1.79)	10.37	12.03	(1.90)	6.30	5.18	0.01	(0.10)	(1.71)
Oct	15.80	(31.48)	(6.59)	(0.14)	6.70	(1.82)	8.04	4.65	1.92	0.23
Nov	(1.13)	(6.46)	7.52	(1.88)	(7.19)	(45.90)	(0.78)	3.00	(1.92)	(4.57)
Dec	5.02	6.11	3.51	5.98	(4.26)	0.48	2.98	(4.11)	2.04	(0.05)

Source: Compiled and Calculated from www.bseindia.com

The researchers made an attempt to compare the percentage changes in index and its effect on capitalisation of BSE-SENSEX. It is observed that most of the cases Index movement and Capitalisation change are going in a parallel direction since, in particular situation data showing dissimilarities in Index and Capitalisation. The highest change in index is observed as 28.26 percent in the month of May, 2009 and lowest as 23.89 percent in the month of October, 2008. As in the case of capitalisation the maximum change is 82.51 percent in the month of May, 2011 and minimum change is 45.90 percent in the month of November, 2012.

Table 7: Yearly quarter wise n1, n0, T-days, and No. of Runs Analysis

Year	n1				n0				T-Days				No. of Runs			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
2007	29	38	42	31	30	23	21	31	60	62	64	63	31	31	31	25
2008	27	28	29	25	34	32	34	33	62	61	64	59	30	32	29	24
2009	32	33	37	29	26	25	26	31	59	59	64	61	33	30	29	35
2010	31	35	37	31	28	27	27	32	60	63	65	64	28	31	37	37
2011	30	26	24	23	31	35	38	36	62	62	63	60	27	27	30	30
2012	38	34	33	32	25	28	29	28	64	63	63	61	31	31	29	34
2013	28	34	34	30	33	28	28	31	62	63	63	62	29	33	26	23
2014	40	31	36	32	22	28	26	25	63	60	63	58	29	29	25	27
2015	31	29	30	28	30	31	33	32	62	61	64	61	22	31	33	29
2016	31	34	33	26	29	27	28	35	61	62	62	62	29	31	33	35

Source: Compiled and Calculated from www.bseindia.com

CONCLUSION:

The study concludes that SENSEX followed random walk procedure which will create interest among investors for a better investment opportunity. When we compile with capitalisation both index and CAP are going in a parallel direction. It implies that the movement of the stock market index can be determined by the Random Walk Model. The investor can notice that the movement of the present index and CAP would make profits. Hence, it can be concluded that the market has evolved and developed based on market conditions.

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