

“A Study on Weak Form of Market Efficiency in India during Covid19”

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ABSTRACT:

This article investigates the weak form of the efficient market hypothesis for the Indian stock market during Covid19 by considering the performance of the five indices of BSE Ltd, including benchmark index Sensex and four-market capitalization based indices. The indices selected for this study purpose are Sensex, BSE All cap, BSE Large cap, BSE Mid cap, BSE Small Cap.

Due to the increasing rate of Covid19 positive cases, the central government of India announced the 21days lockdown in India on 24 March. However, the first case of corona virus was detected in December 2019 by WHO and the virus had started affecting the world from January 2020. For this study purpose we have considered the data during the pandemic period. Eight months data has been taken for the study ranging from 1st January 2020 to 31 August 2020. In this study, the calculation for market efficiency has conducted by using some statistical tools namely Unit root test, Descriptive statistics, Run test and BDS test. The result of the study reveals that the indices are not following a random walk, which means the market was inefficient in weak form during the study period.

Keywords: EMH, Covid 19, Weak form of Market Efficiency, Sensex, Indices

Introduction:

COVID-19 has a significant impact on the global financial markets, including India. All most all the sectors of the world have been affected by the effect of corona virus. Borrowers and businesspersons face job losses, slowed sales, and declining profits as the virus continues to spread around the world. COVID-19 is undoubtedly one of the biggest global events of our lifetimes, presenting first-time challenges to many industries, governments and people all over the world. For the panic among the investors due to the corona virus, a stock market crash has seen in the global financial market. Most of the investors have lost their money due to the financial crash that was more powerful than the subprime crisis of 2008. In this study, we have focused the impact of corona virus on Indian stock market. The concept off efficient market hypothesis (EMH) states that “the share price movements or fluctuations are random and do not follow any regular pattern”. The share prices of the listed company in the secondary market supposed to reflect all the information related to the issuing company, and company or industry related information. Every new information regarding the company or the industry affects the

share price. We can say a market as efficient if the share price reflects all the information available about the company and the share prices are rational and reflect their true economic value. The efficient market hypothesis states three forms of market efficiency. These are weak form of market efficiency, semi strong form of market efficiency and strong form of market efficiency. The weak form of efficient market hypothesis said that the history has no memory that means we cannot predict the future price by analyzing the past price behavior. The share prices move randomly. The semi strong form of market efficiency says the share price reflects all the publicly available information like annual report, announcements, regulatory changes, etc. in strong form of market efficiency the share price reflects all publicly as well as private or insider information. The main objective of this study is to find out whether the five indices follow a random walk or not. If the indices will follow a random walk then we can say that the market is efficient in weak form.

Literature Review:

The Covid 19 or corona virus is a new concept, it came into feature after detection of first corona virus positive case by WHO on 31 December 2019. Some researchers have conducted their studies about the impact of covid 19 on different stock market. But the concept of efficient market hypothesis is not a new one. The first researcher who linked the random walk process to economic processes was French mathematician Louis Bachelier in his Ph.D. dissertation titled "The Theory of Speculation" who noticed that changes of prices of French government papers are unpredictable what forced him to conclude that "The mathematical expectation of the speculator is zero".

In the paper titled "A Comparative Analysis of Stock Price Behaviour on the Bombay, London and New York Stock Exchanges" Sharma and Kennedy (1977) compared the behavior of stock indices of the Bombay, London and New York Stock Exchanges for the period of 1963-73. He used run test and spectral analysis. He concludes that all 3 stock exchanges follow the random walk movement.

Dr. Sushil Kumar Pareek, Dr. Kriti Bhaswar Singh in their article Covid-19 and its Initial Signalling Effects on the Stock Market in India has analyzed the initial signaling effect of pandemic Covid-19 on Indian Stock Market in the post pandemic declaration by World Health Organization. The study result shows a strong negative correlation between these variables, which is statistically significant.

Nuhu A Sansa has compared the impact of covid 19 on USA and China in his article, "The Impact of the COVID - 19 on the Financial Markets: Evidence from China and USA". The simple regression model is applied in this study to examine the effect of covid 19 on financial market. The study was carried out for the month of march 2020, when the impact of corona virus was increasing day by day. In the findings they concluded that a positive relationship exists in between the confirm positive cases of Covid 19 and the financial market. That means the COVID - 19 had a significant impact on the financial markets in China and USA.

Awad and Dara-ghma was conducted a test on Palestinian stock exchange in the year 2009 by using ADF test , Phillips – Perron test , unit root test , seriel correlation and run test . In the result they found that there was an absence of weak form of efficiency in the Palestinian stock exchange. In the study of El-Erian and Kumar in the

year 1995 by using the run test and serial correlations test on the stock markets of Turkey and Jordan found the absence of weak form efficiency

Research Methodology:

In this study, the daily data for Sensex, BSE All cap, BSE Large cap, BSE Mid cap, BSE Small Cap has collected for a period of eight months. The period of the study is 1 January 2020 to 31 August 2020. The data has collected from the official website of BSE Ltd . Various statistical tools used in the study are Unit root test, Jarque-Bera test, Run test and BDS test. Due to the large data size for calculation purpose the statistical software SPSS20 and Eviews8 has used.

For the evaluation of the study the following test will be applied.

For the test of normality, Jarque-Bera Test will be applied.

For the test of stationarity ADF unit root test will be done.

For test of the efficiency level Run test and BDS test will be applied.

Data Analysis

Unit Root test:

The unit root test have used to measure whether the time series is stationary or not. In this study we have conducted the ADF (Augmented Dicky Fuller) test with the null hypothesis that data has a unit root to test the existence of the unit root. The existence of the unit root means the data series is not stationary.

The result of this study in table 1 reflects that the p-value of all the selected indices is greater than the critical value 0.05. Higher the p value indicates that he data series is accepting the null hypothesis that the data series have a unit root. Presence of unit root means the data is not stationary. non stationary data will show different result for different tests which is not reliable. Therefore, we converted the data into 1st difference and test it again. The result of the 1st difference rejected the null hypothesis due to the less p value than the critical value. Now we can conclude that the data series is stationary in 1st difference.

Table – 1
ADF TEST

Index	Level		1 st difference	
	t- statistics	Prob.	t- statistics	Prob.
SENSEX	-1.422626	0.5701	-14.58226	0.0000
BSE ALL CAP	-1.251565	0.6513	-13.97771	0.0000
BSE LARGE CAP	-1.395438	0.5835	-14.41807	0.0000
BSE MID CAP	-1.946119	0.3106	-3.127142	0.0266
BSE SMALL CAP	-1.982981	0.2941	-3.105713	0.0281

Source: Calculation using EViews 8

Descriptive statistics:

In the table 2 for descriptive statistics, analysis we can found that there is a high degree of standard deviation is present for all the indices. The skewness of all the series is non-zero, which indicates that the series is not normally distributed. The value of kurtosis is less than 3 which violates the preliminary condition of random walk. The result of Jarque-Bera test also gives the similar type of result with p value less than 0.05 for all the data series, which rejects the null hypothesis that the data series of sectoral indices are normally distributed. Therefore, we accept the alternate hypothesis, which shows the result of the data series for five sectoral indices are not normally distributed and that does not fulfill the pre condition of random walk.

Table -2

	SENSEX	ALLCAP	LARGECAP	MIDCAP	SMALLCAP
Mean	35957.35	3906.803	4067.239	13385.48	12587.94
Median	36594.33	3968.450	4139.130	13483.41	12784.19
Maximum	41952.63	4564.330	4750.750	15904.71	15025.51
Minimum	25981.24	2805.150	2924.290	9711.440	8872.830
Std. Dev.	4200.639	469.7413	476.6052	1707.757	1729.157
Skewness	-0.262326	-0.295677	-0.294921	-0.173707	-0.299044
Kurtosis	1.894629	1.902260	1.950396	1.797445	1.845973
Jarque-Bera	10.41735	10.81835	10.08668	10.90256	11.75601
Probability	0.005469	0.004475	0.006452	0.004291	0.002800
Sum	6004877.	652436.1	679228.9	2235374.	2102186.
Sum Sq. Dev.	2.93E+09	36629049	37707315	4.84E+08	4.96E+08

Source: calculation using EViews 8

RUN Test :

The Run test or Wald–Wolfowitz Runs test is the most popular and most commonly used statistical tool to test the randomness of a data series. It is basically used to test the weak form of market efficiency. The run test only considers the movements regarding signs like positive sign and negative sign in a time series ignoring the value in the absolute form. In Run test, the number of observed runs is compared with the number of expected runs. The Run test is conducted with the null hypothesis “the data series follow a random walk”. In this study we have conducted the run test by using SPSS software due to the large number of data. The result of the Run test is shown in the table 3. In the result the Z value for all the indices is negative, which indicates that the actual number of runs is smaller significance than the expected number of runs. While calculating the p value we get the result that the p value is less than the critical value 0.05 for all the indices, which leads to reject the null hypothesis that the data series follow a random walk. Therefore, we can accept the alternate hypothesis that the data series is not following a random walk. This leads to the conclusion that the data series is not efficient during the study period for the selected indices.

Table 3
Runs Test

	VAR00001	VAR00002	VAR00003	VAR00004	VAR00005
Test Value ^a	36594.33	3968.45	4139.13	13483.41	12784.19
Cases < Test Value	83	83	83	83	83
Cases >= Test Value	84	84	84	84	84
Total Cases	167	167	167	167	167
Number of Runs	7	7	7	5	5
Z	-12.031	-12.031	-12.031	-12.341	-12.341
Asymp. Sig. (2-tailed)	.000	.000	.000	.000	.000

Source : Calculation using SPSS Software

BDS Test:

The BDS (Brock-dechert-Scheinman) test is a time based dependence test in a series. This test is used to test against a variety of possible deviations from independence including linear dependence, non-linear dependence, or chaos. This test is applied to check whether the residuals are independent and identically distributed (iid) or not. In this study we have used the BDS test to check whether the selected sectoral indices are independent and identically distributed or not. For BDS test the null hypothesis is “the data series is independent and identically distributed”.

The below table 4 shows the result of BDS test, which reveals that the p value of all the sectoral indices for all the dimensions is less than the critical value 0.05. The smaller p value leads to reject the null hypothesis that the data series is independently and identically distributed. Therefore, we can accept the alternate hypothesis that the data series is not independently and identically distributed.

Table 4

BSE SENSEX				
<u>Dimension</u>	<u>BDS Statistic</u>	<u>Std. Error</u>	<u>z-Statistic</u>	<u>Prob.</u>
2	0.180363	0.003402	53.00919	0.0000
3	0.308052	0.005417	56.87223	0.0000
4	0.395450	0.006457	61.24336	0.0000
5	0.453286	0.006736	67.29795	0.0000
6	0.490636	0.006500	75.48534	0.0000
BSE ALLCAP				
<u>Dimension</u>	<u>BDS Statistic</u>	<u>Std. Error</u>	<u>z-Statistic</u>	<u>Prob.</u>
2	0.185289	0.003475	53.32282	0.0000
3	0.315235	0.005504	57.27477	0.0000
4	0.403746	0.006528	61.84617	0.0000
5	0.462624	0.006776	68.27704	0.0000
6	0.500594	0.006506	76.94555	0.0000
BSE LARGE CAP				
<u>Dimension</u>	<u>BDS Statistic</u>	<u>Std. Error</u>	<u>z-Statistic</u>	<u>Prob.</u>
2	0.182267	0.003460	52.67225	0.0000
3	0.310002	0.005477	56.60049	0.0000
4	0.397275	0.006492	61.19819	0.0000
5	0.454797	0.006733	67.54973	0.0000
6	0.491561	0.006460	76.09416	0.0000
BSE MIDCAP				

<u>Dimension</u>	<u>BDS Statistic</u>	<u>Std. Error</u>	<u>z-Statistic</u>	<u>Prob.</u>
2	0.189434	0.003407	55.60487	0.0000
3	0.321767	0.005419	59.37688	0.0000
4	0.412283	0.006455	63.87173	0.0000
5	0.472419	0.006728	70.21790	0.0000
6	0.511227	0.006487	78.80499	0.0000

BSE SMALL CAP

<u>Dimension</u>	<u>BDS Statistic</u>	<u>Std. Error</u>	<u>z-Statistic</u>	<u>Prob.</u>
2	0.191863	0.003556	53.95722	0.0000
3	0.324502	0.005650	57.43573	0.0000
4	0.414717	0.006722	61.69171	0.0000
5	0.475189	0.006999	67.89155	0.0000
6	0.514823	0.006742	76.36421	0.0000

Source: calculation-using EViews

Conclusion

The result of the study shows that the data series for sectoral indices are accepting the null hypothesis for ADF test at level showing existence of unit root but the data series is stationary in first difference. The results also shows that sectoral indices are not normally distributed and do not follow the random walk and also are not independently and identically distributed. From the overall result of the tests, we can conclude that the sectoral indices price movements are not following a random walk and not independently distributed, which leads to the conclusion that the market is not efficient for the given period of study. During the pandemic, the volatility in the market was very high, due to the lock down and shut down effect the economy of the country was moving downward direction. There was also a panic among the investors about the future prospects of the market. A number of factors have affected the market during the pandemic period. In our study, we get the result that the selected indices are not efficient during the study period, but the result may vary for different study periods. Some international factors was also had a great impact on the market during pandemic. In our study period the indices were not efficient but not every time the indices will show the same type of result , therefore the investors should not believe that the market is in efficient for all the time. The study on efficient market hypothesis should be conducted on a regular basis to know the latest market trends.

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