Repercussion of BSE Sensex stocks during Covid-19 Crisis : An empirical examination

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Abstract

The covid-19 crisis has badly affected most of the countries and due to its impact, most of the countries reached a recession in their nation. This present study aims to examine the performance of BSE sensex stocks during the Covid-19 Pandemic in relation to its benchmark index. Secondly, the study analyzed the unit root in the returns of BSE sensex stocks in consideration of pre and during Covid -19 pandemic periods. The study period covers from 1st January 2016 to 21stSep, 2021. The first objective result rejects the null hypothesis and found a strong influence of the benchmark index on all the BSE sensex stocks. To check the unit root test study used the Augmented Dickey-Fuller test (ADF) and the study result revealed that for the pre-Covid period for all the BSE sensex stocks study found no unit root and during the covid-19 period, 13 companies show the unit root in the results. The study found the positive and highest correlation for Indus India Bank to the extent of 67%. To conclude this study observed that it is a hard time to choose the right stocks to earn the expected earnings.

Keywords: Beta, Correlation, Stationary, Unit Root, Covid-19.

1. Introduction

The covid-19 pandemic has adversely hit the economy of national and international countries. Many have lost their lives to this contagious and widespread disease. This pandemic has affected industries in terms of underperformance of businesses, lost financial stability, and created an uncertain situation for the policyholders to take the right decisions in a different set of fields. From the previous literature as mentioned by Gherghina et al; (2020),Yong & Laing, (2020), Contessi & De Pace, (2021) there was an adverse effect from this pandemic crisis on the selected stock market. (Mahler et al; 2021) the study estimated the economic growth contraction and increases in the rate of poverty as economic cost increases. (Verikios, Sullivan, Stojanovsk, 2011) investigated the global economic effect of influenza.

The study results reflect that there will be a powerful and dangerous hit of infections to the economy. (Zambrano-Monserrate et al; 2020) study findings show that maintaining ecology in the best and clean environment will have a reduction of viruses otherwise the situation will be worst by affecting the lives of many. (Ramola, 2021) the study recommended using more modern technology to make online classes convenient for students as well as teachers have to improve in the use of online platforms. On the other hand, there are not many studies that reflect the stability of the Indian stock market. Keeping this in concern the present study is motivated to examine its impact on the BSE Sensex market for the pre and post-period of the pandemic. This study helps to analyse the stability of BSE sensex stocks to check the extent of

variation in the returns of stocks.

2. Review of Literature

The important and relevant literature relating to the current issue has been discussed below. It is observed that there have been many studies being held considering national and international stock markets. All the study result shows the positive, unfavourable impact of the Covid-19 Pandemic. This is as follows:

Contessi & De Pace (2021) empirically analyzed the effect of the first wave of the COVID-19 pandemic on the stock market. The study result shows that initially there was a slow diffusion of stock market distress followed by a rapid fall. Fernandez-Perez et al.,(2021) analyzed the effect of national culture on stock market responses to a global health disaster. The study shows that investor's moods and sentiments are adversely affected by a range of events, including disasters, which in turn drive their investment decisions. Hassan & Gavilanes (2021) explored the repercussions in terms of lost output and growth on different country's stock markets. The study shows poor stock market performance during COVID-19

Kizys et.al., (2021) investigated the Government response stringency index mitigates investor herding behaviour, by way of reducing multidimensional uncertainty. The study found that herding behaviour in international stock markets is more responsive to government interventions during pandemic crises. Government responses decrease investor herding during the COVID-19 pandemic. Michal et al.,(2021) examined the effect of Covid- 19 to understand the stability of different sectors of the Warsaw stock exchange. The study findings show that there is stability in sectorial sub-indices and macro indices with varying degrees. Sahoo (2021) the study revealed that coefficients for Tuesday, Wednesday, Thursday and Friday effects are insignificant. The study revealed strong proof of a negative return for Monday during the COVID-19 crisis.

Talwar et.al., (2021) examined financial attributes that influence the trading activity of retail investors during COVID-19. The study includes financial anxiety, optimism, financial security, deliberate thinking, interest in financial issues, needs for precautionary savings 6 variables. The study shows a positive relationship with all the selected parameters and interest in financial issues as well as deliberative thinking has the greater influence during trading activities. Zaremba et.al.,(2021) to investigate the influence of government policy responses on global stock market liquidity. The study found that the estimated effects of the majority of the policy responses are insignificant. The combination of an increase in loss aversion and information overload may result in the opposite outcome.

Ashraf (2020) examined the national-level uncertainty avoidance decision controls the stock market reaction during the COVID-19 pandemic. The study found negative returns on the stock market. The study also opened up that national culture has a greater impact on stock returns. Baker et.al., (2020) examined the unprecedented U.S. stock market to covid 19.The study found that there was a sharp hit to the stock market of the U.S. The study appreciated the government for undertaking a powerful restriction policy to curb the situation. Chaudhary et.al., (2020) empirically studied the performance of Covid -19 on the Indian stock market. The study found lower mean daily returns, higher variation in returns, negative skewness and positive kurtosis during crisis period.

Conlon et.al, 2020) studied the haven of crypto-currencies for equity markets during COVID-19 in consideration of international equity index investors. The study also found that

uncertainty as well as economic losses in the market results in high volatility and unpredictable situation. The study found that Bitcoin and Ethereum are not safe havens in the international markets but Tether has maintained its safety in most of the studies. This study shows that Tether also lost its haven in international markets impaired downside risk. Czech et.al, (2020)evaluated the short-term reaction of stock markets during the pandemic. The result shows that there is a significant and indirect relationship between stock market indices and crisis. The study evidence that as COVID-19 cases increase there is a decline in the major blue-chip stock market indices.

Erdem (2020a) analyzed the relationship between the freedom of countries and their stock market movements during COVID-19. The study shows the unfavourable effects of the coronavirus on the stock market are less in freer countries. Gherghina et.al.,(2020) analyzed the overall performance of core stocks in the emerging blue-chip sector. The study found more negative returns than positive returns and the spread of stock returns is negatively skewed. Liu et.al., (2020)explored the impact of COVID-19 on financial markets. The results disclosed smaller effects, more volatile stocks and lesser stability. Machmuddah et.al, (2020) investigated the impact of the crisis on stock prices in consideration of pre and post-COVID-19 pandemics. The results show that investors should consider non-economic factors during the investment decision process.

He et.al., (2020) empirically analyzed the market performance and response trends of Chinese industries during the pandemic crisis. The study shows that transportation, heating, and mining, industries have been adversely affected during pandemics whereas, manufacturing, information technology, education, and healthcare industries were not affected greatly. Singh et.al, (2020) investigated the influence of the COVID-19 outbreak on G-20 countries stock markets. The result shows that from day 0-43, 0.70% to 42.69%-higher panic in stock markets, and from day 43-57, 42.69% to 29.77% results in the recovery of stock markets. The study result revealed significant adverse abnormal returns during the 58 days. Takyi & Bentum-ennin (2020) experimented with the impact of COVID-19 on the stock market of thirteen African countries. The study shows that there was no chance that the COVID-19 pandemic would have positive effects on the stock market performance.

Wójcik & Ioannou (2020) researched the actual and potential impacts of the pandemic on financial markets. The study found local and regional financial centres will have a greater impact than international financial markets. The study concluded that there was an important role played by state and public finance in the economy. Yong & Laing (2020) investigated the stock market reaction to COVID-19 from the perspective of the firm's international exposure and multinationals. The results show that international exposure through foreign sales, foreign assets, imports and exports is significant and negatively associated with the short run, the effect reverses in the long run. Firms that are more multinational in their foreign operations are more resilient to global shocks of this nature. Laing (2020)examined the impact of covid-19 on the mining industry. The study found a drastic fall in demand for different types of metals and among these aluminum and copper are strongly affected.

Mishra & Mishra (2020)examined the effect of COVID-19 outbreaks on international financial markets. The study shows the negative behavior of investors towards the outbreak of the COVID-19 pandemic and found markets volatile. Zhang et.al., (2020) investigated impact of COVID-19 pandemic on financial markets. The study also observed the substantial variation in the general patterns of country-specific risks and systematic risks in the global financial markets. The study found that individual stocks have a positive effect. The uncertainty and economic losses are the main reason for stock volatility and predictability.

Erdem (2020b) studied the effect of COVID-19 news on stock market indices returns. The study used 75 countries' COVID-19 data of deaths. The study found significant negative effects on stock market returns and significant positive effects on volatilities. The index volatilities in freer countries are associated with less increase than those in less-free countries. Bahrini & Filfilan (2020) analyzed impact of Covid 19 on GCC countries stock market returns. The study found that effect of Covid 19 on stock market is positive on stock market. But crude oil volatility has the higher effect on stock market. The study also found that investors fear sentiment has the negative relationship to stock market returns.

3. Materials and Methods - Objective of the study

This paper works for two important objectives.

- To examine the performance of BSE sensex stocks with the BSE sensex market benchmark index for the study period 1st January 2016 to 21 Sep 2021.

- To find the unit root in the BSE sensex stocks for pre and during the Covid − 19 Pandemic period.

4. Hypothesis of the Study

Based on the literature survey and current issue hypothesis has been constructed. This is as follows-

- H_0 : There is no direct association between BSE sensex returns and BSE 30 stocks returns.

- H_1 : There is a direct association between BSE sensex returns and BSE 30 stock returns.

- H_0 : There is a unit root in the stock returns of the BSE Sensex stocks for the pre and during the Covid -19 pandemic period.

- H_1 : There is no unit root in the stock returns of BSE sensex stocks for the pre and during the Covid-19 pandemic period.

The first objectives of the study used samples of BSE 30 stocks which are obtained from the BSE website. The study considered BSE sensex as the bench market index to find the association between two variables. With the help of a simple regression model and descriptive statistics performance of stocks has been analyzed. For the unit root test, the study period has been divided into pre and occurrence periods of covid-19. The pre-covid period starts from 1 Jan 2016 to 30 Nov 2019 and consists of 47 months and the Covid -19 pandemic period is considered from 1st Dec 2019 to 21 Sep 2021 and consists of 24 months. The study tested the samples using the Augmented Dickey-Fuller test based on Schwarz info criterion with a max lag of 4 has been applied, as this is the most used methodology for the stationary verification in the time series data. This methodology verifies the results on the parameters of, intercepts, trend, and intercept without these two options. With the help of a t-test and p-values study, results are analyzed. The return for company stocks and benchmark index is obtained with the help of the following formula :

$$R_i = \text{In}\left(\frac{P_t}{P_{t-1}}\right) (1)$$

P_t = Price of today
P_{t-1} = Price of yesterday

The equation for the first stage regression as per CAPM

$$R_{it} = \alpha_i + \beta_i R_{mt} + E_{it} \ldots \ldots \ldots (2)$$

where

R_{it} = Return of each stock for the time period
α_i = intercept value of stock
β_i = slope coefficient in excess of market risk premium
R_M = Return of the market
E_{it} = Error term

The formula to check the unit root test is as follows:

$$\Delta(y_t) = \varphi . y_{t-1} + \varepsilon_t (\text{no intercept, no trend}) \ldots (4)$$
$$\Delta(y_t) = c + \varphi . y_{t-1} + \varepsilon_t (\text{intercept, no trend}) \ldots (5)$$
$$\Delta(y_t) = c + b . t + \varphi . y_{t-1} + \varepsilon_t (\text{intercept and trend}) \ldots (6)$$

5. Results and Discussion

Table-1, Table-2 and Table-3 disclose the results of the study based on descriptive results and beta stability performance during the Covid-19 Crisis. This is been done with the help of the Ordinary least square method as well as descriptive statistics in consideration of important variables. The second objective has been displayed in Table 3, i.e.; the application of unit root test for BSE sensex stocks considering the pre and occurrence period of Covid-19. All these are discussed below and are as follows:

Table 1 : presents the significance of β, *a*,r^2, standard error of BSE Sensex stocks

Sl. No	Company Name	Beta	T value	P-value	intercept	T value	P-value	F value	P-value	Adj r square	Standard Error
1	HDFC	1.15	11.31	0.00	0.00	-0.20	0.85	127.9	0.00	0.65	0.04
2	TITAN	0.97	5.41	0.00	0.02	1.72	0.09	29.32	0.00	0.30	0.08
3	HDFC	1.02	6.30	0.00	0.00	-0.43	0.67	39.71	0.00	0.37	0.07
4	Infosys	0.84	4.35	0.00	0.00	-0.12	0.91	18.88	0.00	0.21	0.09
5	Kotak Mahindra Bank	1.00	7.83	0.00	0.00	0.67	0.50	61.30	0.00	0.47	0.06
6	ONGC	1.20	6.08	0.00	-0.02	-1.65	0.10	37.01	0.00	0.35	0.09
7	Reliance Ind Ltd	1.18	5.62	0.00	0.00	0.28	0.78	31.63	0.00	0.31	0.09
8	Tata Steel	1.24	5.72	0.00	0.01	1.09	0.28	32.72	0.00	0.32	0.09
9	LT	1.07	6.86	0.00	0.00	-0.54	0.59	47.05	0.00	0.41	0.07
10	Hindustan Uniliver	0.23	1.88	0.07	0.02	2.31	0.02	3.52	0.07	0.04	0.05
11	M&M	1.31	6.34	0.00	-0.02	-1.55	0.13	40.23	0.00	0.37	0.09
12	Nestle India	0.38	2.93	0.00	0.02	2.14	0.04	8.57	0.00	0.10	0.06
13	ITC	0.72	4.76	0.00	-0.01	-1.39	0.17	22.69	0.00	0.24	0.07
14	ICICI	1.40	10.34	0.00	0.00	0.17	0.87	106.9	0.00	0.61	0.06

15	Indus India Bank	2.19	11.58	0.00	-0.02	-1.51	0.14	134.1	0.00	0.67	0.08
16	Axix Bank	1.49	11.16	0.00	-0.01	-0.87	0.39	124.6	0.00	0.65	0.06
17	HCL	0.77	3.74	0.00	0.00	0.03	0.97	14.01	0.00	0.16	0.09
18	Bharati Airtel	0.69	4.04	0.00	0.01	0.01	0.50	16.30	0.00	0.19	0.07
19	Maruti Suzuki	1.23	8.21	0.00	0.00	-0.55	0.58	67.35	0.00	0.50	0.07
20	Ultra Tech Cement	0.92	6.39	0.00	0.00	0.54	0.59	40.79	0.00	0.37	0.06
21	TCS	0.73	3.60	0.00	0.00	0.17	0.87	12.97	0.00	0.15	0.09
22	NTPC	0.67	4.56	0.00	-0.01	-0.88	0.38	20.80	0.00	0.23	0.06
23	Tech Mahindra	0.74	4.18	0.00	0.01	0.84	0.40	17.46	0.00	0.20	0.08
24	Bajaj Auto	0.94	6.93	0.00	0.00	-0.40	0.69	48.09	0.00	0.41	0.06
25	Bajaj Fin Serve	1.69	7.16	0.00	0.02	1.43	0.1	51.23	0.00	0.43	0.10
26	Bajaj Finance	1.96	5.92	0.00	0.01	0.37	0.71	35.09	0.00	0.34	0.14
27	SBI	1.50	8.03	0.00	0.00	-0.12	0.90	64.44	0.00	0.49	0.08
28	Sun Pharma	0.60	3.14	0.00	-0.01	-0.56	0.58	9.87	0.00	0.12	0.08
29	Power Grid	0.57	4.02	0.00	0.00	-0.26	0.79	16.13	0.00	0.18	0.06
30	Asian Paints	0.60	4.32	0.00	0.01	1.73	0.09	18.65	0.00	0.21	0.06

Table-1 results are analyzed at a 5% significance level and p-values for all the beta coefficients stand the zero values. This study rejects the null hypothesis stating there is no relationship between stock return and benchmark index. On the other hand, the study evidenced that there is a strong relationship between these two variables and the study result shows statistically significant results. The results conclude that changes in benchmark returns have a direct relationship with all the sensex stocks for the study period 1 January 2016 to 21st September 2021. The standard errors are not much deviated from the model line and these range from 0.04 to 0.14.The adjusted r^2, is within the range of 0.10 to 0.67. The study found that there is much variation in the correlation coefficient among BSE sensex stocks. The study observed that the correlation was higher for the company Indus India Bank to the extent of 67% and the lowest for the company Nestle India at 10%. The intercept values are the average mean or constant return of the particular stock.

Table 2 : presents the Descriptive statistics of BSE Sensex stocks

Sl. No.	Company	Mean	SD	Kurtosis	Skewness	Minimum	Maximum
1	HDFC	0.015	0.075	1.42	-0.34	-0.25	0.17
2	TITAN	0.03	0.09	1.30	-0.47	-0.26	0.29
3	HDFC Bank	0.01	0.09	11.05	-2.21	-0.45	0.22
4	Infosys	0.01	0.10	11.72	-1.78	-0.49	0.31
5	Kotak Mahindra Bank	0.02	0.08	1.00	0.16	-0.20	0.23
6	ONGC	**0.00**	0.11	0.93	-0.33	-0.34	0.26
7	Reliance Industries Ltd	0.02	0.11	7.18	-1.17	-0.51	0.32
8	Tata Steel	0.03	0.12	1.52	0.2	-0.29	0.41
9	L&T	0.01	0.09	3.48	-1.05	-0.32	0.20
10	Hindustan Unilever	0.02	0.06	0.00	0.43	-0.10	0.17
11	M&M	**0.00**	0.11	5.16	-1.23	-0.47	0.29
12	Nestle India	0.02	0.06	0.44	-0.40	-0.16	0.15
13	ITC	**0.00**	0.08	3.18	-0.87	-0.31	0.17
14	ICICI	0.02	0.10	2.37	-0.64	-0.35	0.25
15	Indus Ind Bank	0.02	0.14	8.62	-1.06	-0.68	0.46
16	Axix Bank	0.02	0.10	6.82	-1.44	-0.46	0.22
17	HCL	0.01	0.10	10.65	-1.71	-0.50	0.27
18	Bharati Airtel	0.02	0.08	1.20	0.13	-0.18	0.28
19	Maruti Suzuki	0.01	0.09	2.00	-0.76	-0.32	0.25
20	Ultra Tech Cement	0.02	0.08	0.11	-0.32	-0.23	0.17
21	TCS	0.01	0.10	11.96	-2.0	-0.51	0.24

22	NTPC	**0.00**	0.07	1.35	0.12	-0.21	0.21
23	Tech Mahindra	0.02	0.09	0.87	-0.03	-0.24	0.25
24	Bajaj Auto	0.01	0.08	4.96	-0.07	-0.30	0.30
25	Bajaj Fin Serve	0.04	0.14	5.42	0.09	-0.49	**0.57**
26	Bajaj Finance	0.03	0.18	12.50	-2.23	**-0.90**	0.48
27	SBI	0.02	0.11	1.93	0.19	-0.35	0.38
28	Sun Pharma	**0.00**	0.09	1.57	0.55	-0.22	0.32
29	Power Grid	0.01	0.07	2.6	-0.64	-0.26	0.17
30	Asian Paints	0.02	0.07	0.81	0.57	-0.13	0.25

Table-2 presents the descriptive results in which the average mean ranges from 0.00 to 0.04 and all the company shows a low average mean for the sample period. The company ONGC, ITC, M&M, NTPC and Sun Pharma has zero average means and these are the underperformed companies for the chosen study period. The highest average mean is declared by the company Bajaj Fin Serve. The standard deviation ranges from 0.06 to 0.18 and in this the company Bajaj Finance was found to be more risky stocks. The least risky stock is Hindustan Unilever and Nestle India. The study result shows the negative highly skewed data sets. The 16 companies' data distribution is less than three and observed a thinner tail in the distribution of the data set and the remaining 14 companies have a data distribution greater than three and observed a heavier tail in the distribution of the data set. The minimum return was the highest for the company Bajaj Finance Ltd among all the stocks and the maximum return reached for the company Bajaj Fin Serve Company.

Table 3 : Results of Augmented Dicky Fuller test for BSE Sensex stocks for the pre and Covid-19 pandemic period.

No.	**company**	**Pre-Covid Period**			**Covid period**	
		t-test		**P values**	**t-test**	**P values**
1	Asian Paints	constant	-6.31		-5.89	0.00*
		constant linear trend	-6.24		-6.01	
		none	-5.87	0.00	-5.03	
2	ICICI	constant	-10.46		-5.23	0.00*
		Constant linear trend	-10.34	0.00	-5.72	
		none	-9.23		-5.14	
3	HCL	constant	-3.93		-2.25	**0.19**
		constant linear trend	-3.79	0.02	-2.00	**0.56**
		none	-4.03		-1.10	**0.23**
4	Housing Development Bank Of India	constant	-7.61		-5.09	0.00*
		constant linear trend	-7.55	0.00	-5.40	
		none	-6.87		-5.15	
5	Hindustan Uni Unilever	constant	-5.66		-0.07	**0.74**
		constant linear trend	-5.59	0.00	-2.26	**0.43**
		none	-5.08		-0.56	**0.46**
6	Indus India Bank	constant	-7.79		-5.16	0.00
		constant linear trend	-8.23	0.00	-2.86	**0.19**
		none	-7.52		-5.21	0.00
7	Infosys	constant	-6.84		-3.11	0.04
		constant linear trend	-6.77	0.00	-2.98	**0.16**
		none	-6.92		-4.31	0.00
8	ITC	constant	-7.74		-3.42	0.02*
		constant linear trend	-7.68	0.00	-3.80	0.03*
		none	-7.82		-3.52	0.00*
9	Larsen & Tourbo	constant	-5.17		-3.52	0.02*
		constant linear trend	-5.17	0.00	-3.95	0.02*
		none	-5.21		-3.54	0.01*

10	Maruti Suzuki	constant	-5.37	0.00	-4.81	0.00*
		constant linear trend	-5.78		-4.71	
		none	-5.08		-4.91	
11	Nestle India	constant	-8.11	0.00	-4.62	0.00*
		constant linear trend	-8.00		-4.61	
		none	-6.89		-4.49	
12	NTPC	constant	-8.15		-2.19	**0.21**
		constant linear trend	-6.18		-5.90	0.00
		none	-8.25		-1.13	**0.22**
13	ONGC	constant	-5.77	0.00	-4.02	0.00*
		constant linear trend	-5.73		-4.62	
		none	-6.89		-4.04	
14	SBI	constant	-8.07	0.00	-4.03	0.00*
		constant linear trend	-8.13		-4.44	
		none	-7.72		-3.99	
15	TCS	constant	-11.10	0.00	-3.28	0.03
		constant linear trend	-11.00		-2.90	**0.18**
		none	-11.17		-0.66	**0.41**
16	Titan	constant	-5.73	0.00	-2.73	**0.08**
		constant linear trend	-5.67		-3.45	**0.07**
		none	-5.82		-4.26	0.00
17	Bajaj Auto	constant	-7.60	0.00	-4.85	0.00*
		constant linear trend	-7.56		-4.73	
		none	-7.45		-4.86	
18	Bajaj Fin Serve	constant	-5.85	0.00	-3.76	0.00
		constant linear trend	-6.07		-3.46	**0.07**
		none	-5.86		-4.54	0.00
19	Bajaj Finance	constant	-5.17	0.00	-4.24	0.00*
		constant linear trend	-5.21		-3.86	0.03*
		none	-6.55		-4.38	0.00*
20	Bharati Airtel	constant	-7.01	0.00	-3.90	0.00*
		constant linear trend	-6.93		-4.07	0.02*
		none	-6.95		-3.83	0.00*
21	HDFC Bank	constant	-6.42	0.00	-5.61	0.00*
		constant linear trend	-7.04		-5.62	
		none	-6.40		-5.53	
22	Kotak Mahindra	constant	-7.90	0.00	-3.76	0.01*
		constant linear trend	-7.81		-3.85	0.03*
		none	-6.85		-3.80	0.03*
23	M&M	constant	-6.98	0.00	-3.81	0.00*
		constant linear trend	-7.02		-5.08	
		none	-6.94		-3.78	
24	Power Grid	constant	-8.81	0.00	-4.58	0.00
		constant linear trend	-9.42		-3.60	**0.056**
		none	-8.60		-4.70	0.00
25	Reliance Industries Ltd	constant	-8.19		-2.62	**0.10**
		constant linear trend	-8.10		-1.89	**0.61**
		none	-8.04		-2.16	0.03
26	Sun Pharma	constant	-6.97	0.00	-4.56	0.00*
		constant linear trend	-6.94		-4.49	
		none	-6.91		-4.21	
27	Tata Steel	constant	-5.66	0.00	-3.10	0.04
		constant linear trend	-6.09		-3.06	**0.14**
		none	-5.52		-3.05	0.00
28	Tech Mahindra	constant	-7.56	0.00	-3.09	0.04
		constant linear trend	-7.45		-3.33	**0.08**
		none	-7.32		-2.96	0.00
29	Ultra Tech Cement	constant	-7.35	0.00	-4.40	0.00
		constant linear trend	-7.48		-4.55	0.00

		none	-7.26		-0.30	**0.55**
30	Axix bank	constant	-6.94	0.00	-5.22	0.00*
		constant linear trend	-6.89		-5.49	
		none	-6.61		-5.28	

*firms which are statistically significant during Covid-19 crisis @ 5% significance level

Table 3 presents the results of the Unit root test and the study applied ADF unit root for BSE sensex stocks. The main aim is to check the stationary of 30 stocks during the pre-and during the Covid-19 pandemic. The study used the Augmented Dicky fuller test which is been used in most of the literature and provides accuracy in the results. The study result revealed the absence of unit root for all the sensex stocks in the pre-period and the Covid period study found approximately 13 companies have unit root in their stock returns. This study accepted the null hypothesis for 13 companies and results are found to be insignificant to these stocks. The companies affected insignificantly by Covid 19 are HCL, Hindustan Unilever, Indus India Bank, Infosys, NTPC, TCS, Titan, Power Grid, Reliance Industries Ltd, Tata Steel, Tech Mahindra, Ultra Tech Cement, Bajaj Fin Serve stocks. The study rejects the null hypothesis for 17 companies and significant stocks are Asian Paints, ICICI, Housing Development Bank of India, ITC, Larsen & Tourbo, Maruti Suzuki, ONGC, SBI, Bajaj Auto, Bajaj Finance, Bharati Airtel, HDFC Bank, Kotak Mahindra, M&M, Axix bank, Sun Pharma, and Nestle India.

6. Conclusions

Like most of the previous literature, as discussed in the literature column above shows an adverse effect on study samples. This study also found an unfavorable effect from the covid-19 crisis on the BSE 13 stocks for the post-period of covid-19, which are statistically insignificant. The study found an impact of covid-19 on 13 BSE stocks on monthly stock returns for the study period from 1 January 2016 to till recent past. This study also justified that the benchmark index maintained its strong positive relationship with BSE sensex stocks for the current period. This benefits the traders of the stocks to take important investment decisions. There is a scope for the researcher to find the effect of covid-19 considering different country's stock markets by applying some different methods too.

References

[1] Ashraf, B. N. (2020). Stock markets' reaction to Covid-19: Moderating role of national culture. Finance Research Letters, (November), 101857. https://doi.org/10.1016/j.frl.2020.101857

[2] Bahrini, R., & Filfilan, A. (2020). Impact of the novel coronavirus on stock market returns : evidence from GCC countries. Quantitative Finance and Economics, 4(4), 640–652. https://doi.org/10.3934/QFE.2020029

[3] Baker, S. R., Bloom, N., Davis, S. J., Kost, K., Sammon, M., & Viratyosin, T. (2020). The Unprecedented Stock Market Reaction to COVID-19. NBER Working Paper Series, (June), 1–24.

[4] Chaudhary, R., Bakhshi, P., & Gupta, H. (2020). The performance of the Indian stock market during COVID-19. Investment Management and Financial Innovations, 17(3), 133–147. https://doi.org/10.21511/imfi.17(3).2020.11

[5] Conlon, T., Corbet, S., & Mcgee, R. J. (2020). Research in International Business and Finance Are cryptocurrencies a safe haven for equity markets ? An international perspective from the COVID-19 pandemic. Research in International Business and Finance, 54(May), 101248. https://doi.org/10.1016/j.ribaf.2020.101248

[6] Czech, K., Wielechowski, M., Kotyza, P., Benešová, I., & Laputková, A. (2020). Shaking

stability: COVID-19 impact on the Visegrad Group countries' financial markets. Sustainability (Switzerland), 12(15), 1–18. https://doi.org/10.3390/SU12156282

[7] Erdem, O. (2020a). Freedom and Stock Market Performance during Covid-19 Outbreak. Finance Research Letters, 101671. https://doi.org/10.1016/j.frl.2020.101671

[8] Erdem, O. (2020b). Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID- 19 . The COVID-19 resource centre is hosted on Elsevier Connect , the company ' s public news and information. (January).

[9] Fernandez-Perez, A., Gilbert, A., Indriawan, I., & Nguyen, N. H. (2021). COVID-19 pandemic and stock market response: A culture effect. Journal of Behavioral and Experimental Finance, 29, 100454. https://doi.org/10.1016/j.jbef.2020.100454

[10] Gherghina, S. C., Armeanu, D. S., & Joldes, C. C. (2020). Stock Market Reactions to COVID-19 Pandemic Outbreak : Quantitative Evidence from ARDL Bounds Tests and Granger Causality Analysis. International Journal of Enviornmental Research and Public Health, 17(18), 1–35.

[11] Hassan, S. M., & Gavilanes, J. M. R. (2021). First to React Is the Last to Forgive: Evidence from the Stock Market Impact of COVID 19. Journal of Risk and Financial Management, 14(1), 26. https://doi.org/10.3390/jrfm14010026

[12] He, P., Sun, Y., Zhang, Y., & Li, T. (2020). COVID – 19 ' s Impact on Stock Prices Across Different Sectors — An Event Study Based on the Chinese Stock Market. Emerging Markets Finance and Trade, 56(10), 2198–2212. https://doi.org/10.1080/1540496X.2020.1785865

[13] Kizys, R., Tzouvanas, P., & Donadelli, M. (2021). From COVID-19 herd immunity to investor herding in international stock markets: The role of government and regulatory restrictions. International Review of Financial Analysis, 74(December 2020), 101663. https://doi.org/10.1016/j.irfa.2021.101663

[14] Laing, T. (2020). The economic impact of the Coronavirus 2019 (Covid-2019): Implications for the mining industry. The Extractive Industries and Society, 2019, 1–5. https://doi.org/10.1016/j.exis.2020.04.003

[15] Liu, H., Manzoor, A., Wang, C., Zhang, L., & Manzoor, Z. (2020). The COVID-19 outbreak and affected countries stock markets response. International Journal of Environmental Research and Public Health, 17(8), 1–19. https://doi.org/10.3390/ijerph17082800

[16] Machmuddah, Z., Utomo, S. D., Suhartono, E., Ali, S., & Ghulam, W. A. (2020). Stock market reaction to COVID-19: Evidence in customer goods sector with the implication for open innovation. Journal of Open Innovation: Technology, Market, and Complexity, 6(4), 1–13. https://doi.org/10.3390/joitmc6040099

[17] Mahler, D. G., Yonzan, N., Lakner, C., Aguilar, R. A. C., & Wu, H. (2021). Updated estimates of the impact of COVID-19 on global poverty: Turning the corner on the pandemic in 2021? World Bank Data Blog. Retrieved from https://blogs.worldbank.org/opendata/updated-estimates-impact-covid-19-global-poverty-turning-corner-pandemic-2021

[18] Michal, B., Orzeszko, W., & Stawarz, M. (2021). Covid-19 pandemic and stability of stock market-A sectoral approach. Economics and Finance, 5–24.

[19] Mishra, P. K., & Mishra, S. K. (2020). Corona Pandemic and Stock Market Behaviour : Empirical Insights from Selected Asian Countries. https://doi.org/10.1177/0976399620952354

[20] Ramola, R. C. (2021). Challenges and Opportunities for Higher Education amid the COVID-19 Pandemic: The Philippine Context. Pedagogical Research, 8(2), 29–32. https://doi.org/10.29333/pr/7947

[21] Sahoo, M. (2021). COVID-19 impact on stock market: Evidence from the Indian stock

market. Journal of Public Affairs, (December 2020), 1–13. https://doi.org/10.1002/pa.2621

[22] Singh, B., Dhall, R., Narang, S., & Rawat, S. (2020). The Outbreak of COVID-19 and Stock Market Responses: An Event Study and Panel Data Analysis for G-20 Countries. Global Business Review. https://doi.org/10.1177/0972150920957274

[23] Takyi, P. O., & Bentum-ennin, I. (2020). The impact of COVID-19 on stock markets performance in Africa: A Bayesian Structural Time Series Approach. Journal of Economics and Business, 105968. https://doi.org/10.1016/j.jeconbus.2020.105968

[24] Talwar, M., Talwar, S., Kaur, P., Tripathy, N., & Dhir, A. (2021). Has financial attitude impacted the trading activity of retail investors during the COVID-19 pandemic? Journal of Retailing and Consumer Services, 58(September 2020), 102341. https://doi.org/10.1016/j.jretconser.2020.102341

[25] Verikios, G., Sullivan, M., Stojanovski, P., Giesecke, J. A., & Woo, G. (2011). The Global Economic Effects of Pandemic Influenza. 14th Annual Conference on Global Economic Analysis, (October), 1–41.

[26] Wójcik, D., & Ioannou, S. (2020). COVID-19 and Finance: Market Developments So Far and Potential Impacts on the Financial Sector and Centres. Tijdschrift Voor Economische En Sociale Geografie, 111(3), 387–400. https://doi.org/10.1111/tesg.12434

[27] Yong, H. H. A., & Laing, E. (2020). Stock market reaction to COVID-19: Evidence from U.S. Firms' International exposure. International Review of Financial Analysis, 101656. https://doi.org/10.1016/j.irfa.2020.101656

[28] Zambrano-Monserrate, M. A., Ruano, M. A., & Sanchez-Alcalde, L. (2020). Indirect effects of COVID-19 on the environment. Science of the Total Environment, 728(138813), 1–4. https://doi.org/10.1016/j.scitotenv.2020.138813

[29] Zaremba, A., Aharon, D. Y., Demir, E., Kizys, R., & Zawadka, D. (2021). COVID-19, government policy responses, and stock market liquidity around the world: A note. Research in International Business and Finance, 56(2016), 101359. https://doi.org/10.1016/j.ribaf.2020.101359

[30] Zhang, D., Hu, M., & Ji, Q. (2020). Financial markets under the global pandemic of COVID-19. Finance Research Letters, 101528. https://doi.org/10.1016/j.frl.2020.101528