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The impact of Covid-19 on stock market returns in India

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Abstract: We examine the impact of Covid-19 on the stock market returns in India. This paper uses the autoregressive integrated moving average (ARIMA), autoregressive conditional heteroscedasticity (ARCH), and general linear model (GLM). The data was used to analyse pre-Covid and Covid markets' daily closing prices of stock market indices. After the outbreak of Covid-19, the stock market became nervous as BSE Sensex and NSE Nifty fell by 38%. It led to a 27.31% loss in the total stock market from the beginning of the year. We find that the daily growth rate in Covid-19 cases and Covid-19 deaths are negatively associated with stock returns. Using information criteria and forecasting accuracy measures, we show that the Covid-19 confirmed cases contribute statistically significant information to the modelling of volatility and increase the forecasting ability of the volatility of the Indian stock market index, leading to a decrease in the mean stock index.

Keywords: Covid-19; stock price; market returns; economic growth; autoregressive integrated moving average; ARIMA; ARCH.

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Biographical notes: Nenavath Sreenu is a Faculty in the area of Finance and Accounting in the Department of Management Studies, MANIT Bhopal. He has his PhD in Management Studies from the prestigious University of Hyderabad, and an MBA in Finance from Jawaharlal Nehru Technological University, Hyderabad. He has guided one PhD Scholar and 2 scholars working on the topic of infrastructure Finance and Digital finance. To his credit, he has guided more than 45 MBA students in the diverse fields of Financial Economics, Financial Management, Accounting, Banking, Infrastructure Finance, Healthcare Finance, Financial Derivatives and "Behavioral Finance". He has edited three books, Financial Markets and Services, Recent Trends in Management and Advance in International Trade and Finance. He has published more than 20 research papers in reputed National and International Journals. Four of his papers are also under review with management journals of international repute (SCOPUS, WOS and ABDC).

1 Introduction

The Covid-19 virus has led to an unprecedented distraction to the Indian economy and also an unmatched crash in stock market returns. Characteristically, a main market-wide course trend considered to stop the stock market return from dwindling through the level had been activated three times from March to April 2020. Investors inescapably grieved substantial losses from reducing stock prices and returns. Uncertainties about the emergency and its influence on the international market quickly blew out to the remainder of the globe. That is, the concert of the Indian stock market was a foremost indicator of the ups and downs of international markets, predominantly under such environments. This research study thus delivers an inclusive relationship between Covid-19 and the unpredictability of the stock market performance (including both return certainty and price unpredictability), which helps the interests of stockholders when making investment conclusions during tough times. Sreenu (2019). Pieces of evidence in the previous demonstrate that emergencies induce risks but also generate investment prospects: stock return certainty, and price instability significantly increase in difficult times. Shambaugh (2020). Afterwards, the occurrence of Covid-19, there are a growing number of research studies on stock market responses to the emergency. Sreenu and Suresh Naik (2021). The inwards consent is that stock market prices strictly let fall and market price variation significantly distended following the incidence of the Covid-19 disease. However, those research papers did not examine whether and when Covid-19 activated and the affected fluctuations in the stock market concert presumptuous, with no prior acquaintance of the discontinuity location. Additionally, the paper can be focused on market price fluctuations, and volatility but is unsuccessful in the apprehension of return certainty, which is a significant theme in the economics literature.

Even though there is inadequate existing literature associated with the Covid-19 impact on the stock market, current experiential research has provided a stimulating outcome. Ruiz Estrada et al. (2016), in their paper on stock markets and financial institutions, have found that there is a fall in the share of crude oil, equity shares, and bonds all over the globe as an outcome of the Covid-19. Social distancing procedures unfavourably affected the efficiency of the firms and brought about a decline in income, higher operating costs, and also low cash inflow tasks for the firms. Sreenu (2019) thinks that the shockwave from this Covid-19 can raise the volatility that can destructively affect the economic growth and financial system of all nations. Utmost of the established and emerging nations' stock markets and financial systems are negatively affected by this surprising Covid-19 disease. World to the economy, US stock market and economic growth are negatively affected and market returns fall negatively 3 times in March 2020 (Sreenu et al., 2021a). The stock market returns of European Union and Asia nations have also jumped at a negative level. The UK's leading index FTSE collapsed by more than 10% on March 12, 2020 (Baret et al., 2020). Capri (2020), experimental evidence that the stock market returns of Japan had thrown down more than 20% between December 2019 and January 2020. The Spanish stock market and Hong Kong, also declined by 25.1, 14.75, and 12.1% in their prices during March 2020 (George, 2020). In his research paper, also found a destructive impact of the Covid-19 on stock returns of the NIFTY50 and Sensex30 and an insignificant impact on the composite index of the stock market (Azimili, 2020), highlights that the Covid-19 virus carried the entire globe during economic crises more dangerous than the Global Crises of 2007 and 2008. Steadily, the nastiest effect of the Covid-19 spread to the developing economy also. If the

study contemplates the financial market of the developing economy, a miserable depiction caught our eyes as this economy is worst hit by the downfall of all prices. The topmost leading developing economies such as India, Brazil, China and Mexico slowly moving toward hard mobility boundaries that will bring down the developing economies to a decline of 1% in 2020. India declared Janata Curfew on March 22, 2020, and a lockdown policy to sustain social distancing exercises to control the outbreaks of Covid-19. As India declared such a lockdown policy, numerous economic actions have been stopped abruptly. The financial market of India is perceived as strident volatility as an outcome of the distraction of the international market (Sreenu, 2019). As an outcome of the fallout in the international financial market, the Indian stock market also witnessed strident volatility. It has also tolerated the effects of Covid-19 disease.

The study elucidated, why the market stakeholder makes decisions divergent to coherent market stakeholders' prediction of stakeholder decision is an important issue and it plays a significant role in the behavioural finance theory. The important challenges have been given by Covid-19 to individual lives and sustaining the economic and other development activities. Besides, the disproportionate existence of death and disease, many individuals across the country are frightened because of this fast-spreading Covid-19. Such outside and unanticipated shockwaves can carry down economic trends and rapidly transform existence in the investor sentiment, and during Covid-19 the investor sentiment badly affects stock market activity. Kaplanski and Levy (2009) illustrated that the investor's sentiment can be affected by bad thinking and anxiety, that an individual's decision and sentiment, maybe more negative about future expected returns and consequently incline to take rarer risks. The apprehension of investors can generate negative thoughts that can badly affect investment decisions and the resulting returns on assets. The abnormal circumstances created by Covid-19 offer the stakeholders and chance to evaluate the effect on the market returns, and the affected throughout the country due to an unpredicted outbreak of the Covid-19 during the study period. In this paper, the discussion of the impact of Covid-19 on market expected returns as computed by leading stock indices during the lockdown period. The above section indicated variables showed a negative influence on the stock market reason because of the short time of the Covid-19 occurrence. Finally, the paper examined the influence of the unpredicted occurrence of Covid-19 on market indices, and performances, and the future effects on developing macroeconomic variables in India (Sreenu et al., 2021b).

2 Literature review

Arafa and Alber (2020) looked at the influence of Coronavirus spread on the MENA region's stock markets. Coronavirus has been quantified regarding total cases, total fatalities, new cases, and new deaths, whereas stock market return has been assessed regarding the stock market index. According to the findings, Coronavirus cumulative mortality and fresh deaths hurt stock market returns in MENA nations. During the entire period, a robustness check was conducted for each country, revealing a significant effect of Coronavirus cumulative cases in Jordan and Tunisia, as well as a significant effect of Coronavirus cumulative deaths in Jordan, Morocco, and Tunisia, but no evidence of the effects of Coronavirus new cases or Coronavirus new cases. Based on the overall number of confirmed cases, Ganie et al. (2022) looked at the impact of Covid-19 on stock markets in the top six impacted nations. They also looked at the virus's impact on stock

market volatility and the aberrant returns achieved by the markets during the epidemic. They looked at the most volatile event times in connection to the daily rise in the Covid cases, as well as the following returns generated by the markets throughout these sub-periods (Kowalewski and Śpiewanowski, 2020). The influence of Covid-19 on stock markets may be seen in the rise in volatility and the occurrence of large anomalous returns among the sample indices. The results show that among the chosen nations, Brazilian stock indexes have had the greatest reduction, with a drop of more than 50% during the epidemic, while Mexican indices have experienced the least, with a drop of roughly 30% during the same period. Rakshit and Neog (2021), examined how exchange rate volatility, oil price returns, and Covid-19 instances affected stock market returns and volatility in a variety of developing market nations. They compared the performance of emerging nations' stock markets during the Covid-19 pandemic to pre-COVID and the global financial crisis (GFC) periods. During the coronavirus epidemic, they discovered that exchange rate volatility had a negative and substantial impact on market returns in Brazil (BOVESPA), Chile (S&P CLX IPSA), India (SENSEX), Mexico (S&P BMV IPC), and Russia (MOEX). Regarding the impact of oil price returns, they discovered a positive correlation between oil prices and stock market returns in all the economies studied. During the pandemic, Russia, India, Brazil, and Peru's stock markets were more volatile than during the GFC (Goodell and Goutte, 2020). Kumar et al. (2021) investigated the impact of the Covid-19 outbreak on Indian companies listed on the NSE and how it affected different industries. To further understand the impact of size during severe occurrences, a sub-sample study based on market capitalisation was conducted. Bash and Alsaifi (2019). The various industries are divided into three groups based on their response to the Covid-19 outbreak: severely negatively affected, moderately negatively affected, and mildly negatively affected. According to the paper, the pandemic has a greater impact on above-median market capitalised enterprises than on below-median market-capitalised firms, contradicting the size effect phenomenon. The findings can help investors manage their portfolios and reduce the systemic risk of their investments amid severe occurrences like pandemics, wars, and other disasters (Guo et al., 2020).

Global crude oil prices also took a low and gold prices, skyrocketed (Beckmann et al., 2019). The entire supply chain got hit by decisions made by policymakers as the organisations were forced to shut down and local consumption went down. This is a sign of worry when the citizens instead of relying on their country-specific currencies, prefer to shift to a more trustworthy store of value, meaning they are not confident that the current leadership would be able to handle the challenges posed by the pandemic (Bandyopadhyay, 2022). Gold is the widely accepted store of value that attracts such people in troubled times; generally, when an unexpected situation arises, the value of gold goes up to unprecedented levels (Harris and Shen, 2017). As a result, it could completely shake the markets. Investors, in general, are regarded as poor decision-makers, and they overreact to recent information. The above-mentioned characteristic makes the market fall to such levels and equities tend to deviate from their fundamental value (Orleéan, 2004). As the markets are run by 'collective belief" and investors watch and observe the form, of the opinion and react accordingly. That's why investors' overreaction hypothesis (IOH) challenges the efficiency of markets. Examining the effect of various unexpected events on share prices is significant. One such unexpected event, the Covid-19 pandemic recently dashed economies around the world and affected the stock market. Managing risk is a very important aspect of any business decision (Varma

et al., 2021). When the world is full of uncertainty, it becomes imperative to look in solution-oriented ways. The fall in markets was more for some sectors, whereas Healthcare, IT Pharma, and FMCG remained optimistic during tough times as well. Now, it posed a huge opportunity to make money for people having some idle cash available to them accompanied by a willingness to take risks in such uncertain times (Narayan et al., 2022). Our capabilities in the healthcare and pharma sector gave a big boost to our economy when our indigenous vaccine manufacturers came up with their vaccines and built the confidence among the public that we are going to come out of this hardship soon (Hong et al., 2021). The large-scale rollout of vaccines to the public and messages from the government encouraged people to take vaccines and continue to return to their workplace with strict preventive measures to contain the spread of the virus as much as possible (Deb et al., 2022). Also, the continued effort of the government to strengthen our manufacturing sector along with schemes to support the people from the bottom of the pyramid with necessities like food, healthcare, etc. contributed to bringing the situation back on track.

Covid-19 gave us a lot of lessons to learn from being it managing our economy during tough times; from the point of view of managing our finances, governance, and administration, to having our indigenous capabilities to tackle the adversities on our own. This is obvious as managing finances becomes a challenging task for everyone including big corporations. So, how things should be organised so that it creates a buffer for the movement of cash within the system; otherwise, the entire system may fail and run out of business. This research paper helps the literature review of global and national investment ventures in three stages. In the first stage, the paper highlighted the impact of the Covid-19 market returns and investor behaviour approach. In the second stage, the paper examined the outbreak of the Covid-19 in a short and long period and how it will affect the stock market and macroeconomic variables, further also examined the spillover effects on the development and domestic and non-domestic investment during the Covid-19 period. The final stage delivers a situation for evaluating trends in Indian markets after the Covid-19 subsides.

3 Data and methodology

The current research paper examines data based on secondary sources. The data have been collected from the Indian stock market (NSE and BSE) on daily closing prices of NIFTY50 and Sensex30 Indices. Data has been collected from 2010 to 2021, including the pre, post and Covid-19 duration period. The pre-Covid-19 period has been considered from 2010 to January 2020. Post-Covid-19 has been considered after November 2021, and the Covid-19 period has been examined from 2020 March to 2021-October. And also used the Indian stock market indices, which are measured for the representative cases in the paper. Further, also, the paper has selected only the Stock market returns and the number of Covid-19 confirmed cases during the Covid period. This analytical model has explored the extremes of economic activity that have badly damaged India's economy. Due to the reality that Covid-19 has not been removed from India and worldwide yet, this research paper examined based on the experimental research on the Covid-19 outbreak phase in the assigned period. In this research study, the closing price of the stock market (NSE &BSE) has been measured to examine the volatility of the stock market. In the valuations, the paper takes the natural logarithm of each stock price data to diminish the

observed skewness in the stock market price data distribution. The research paper tested the hypothesis that Covid-19 has indicated the negative effects on the stock market indices and spill-over effects on other macroeconomic parameters in the stock market. The paper also uses the ARIMA test, ARCH model, GLM analysis, and robustness tests to analyse the impact of Covid-19 on stock market returns and the overall effect on economic growth. The stock market return has been calculated based on variation in opening and closing stock price return during the pre-Covid-19 and Covid-19 periods. To calculate the market return, the following method has been applied.

$$SMRt = \ln CPt - \ln CPt - 1 \tag{1}$$

Here, *SMRt*, *CPt*, and $CPt - 1$ signify the day-wise stock market return, the closing price at time t, and the previous day's closing price of the stock at time t–1, correspondingly, though ln represents the natural log (nlog).

To examine whether a time series data is stationary or non-stationary, a unit root test has been used or not. The paper applies the Phillips and Perron (PP) unit root test to determine the correct output because it does heteroscedasticity and autocorrelation constancy correction to the augmented Dickey-Fuller (ADF) test. To test heteroscedasticity errors PP test is used in most important situations. The augmented Dickey-Fuller (ADF) test is constructed on the estimate of the following regression:

$$\Delta X_t = \beta_0 + \tau_1 X_{t-1} + \sum_{1-t}^{q} \alpha_0 \Delta X_{t-1} + \propto_t \tag{2}$$

From equation (2), the explanation of variables. Here, Δ signifies the first difference operative, and q represents a lag value. β_0 signifies a constant, $t1$ and α_0 are parameters, and ε_t represents a stochastic error. If, $t = 0$, then the series is supposed it be a unit root and nonstationary. The ADF test determines the lagged difference term of the regression to make available serial correlation in the error term. Next level, PP practised a nonparametric serial correlation model to determine the serial correlation in the error term without accumulation of lagged difference term. In this connection, the PP test can be measured as more beneficial than the ADF test. PP test examines based on the estimation of the following regression equation.

$$\Delta X_t = \beta + qX_{t-1} + \propto_t \tag{3}$$

From equation (3), the following variables explain Here, β indicates constant value; q signifies parameter value, and ε shows the residual.

4 Empirical results

The paper begins by seeing the outcomes of Covid-19 effects on the stock market volatility and returns, according to the Indian timeline, the paper first calculated the average, deviation, t-test, and significance level to determine the stock market returns while comparing to Covid-19 positive cases and death cases. Table 1 value also considers the columns and rows illustrating the number of stocks trading each day. The t-test has

indicated that the economic impact results from it have shown negative growth in stock market returns.

Table 1 Descriptive statistics

Variable	*N*	*Average*	*Std. Dev*	*Minimum*	*Maximum*
Observation	127	64	36.8058	1	127
Total Covid-19 cases	127	34664.56	57097.9	1	226770
Total Covid-19 deaths	127	1041.465	1653.041	0	6348
NSE Closing price	127	9769.573	1154.353	7610.25	12201.2
NSE Returns	127	–0.156171	2.858982	–13.9037	8.40029
BSE closing Price	127	33339.23	3905.859	25981.24	41565.9
BSE Returns	127	–0.1706447	2.918838	–14.1017	8.594739

The main variable is the stock return from the NSE and BSE, sub-variables are the growth in total confirmed cases, and growth in total cases of death, based on the market closing price and opening are converted into natural logarithm of market capitalisation, and the market-to-book ratio.

The paper presents a review of the analysis and integrated it into this research study. The paper can be shown the maximum stock return for the day during the lockdown period. Table 1 explains the summary of the statistics for the selected variable. Market returns are restrained as changes in the stock market index. The progress in Covid-19-positive cases was measured as the growth in corona-confirmed cases and death rates in a day. The paper observes that the market returns n on day NSE closing price and BSE closing price are evaluated as the changes in the market Index.

1 Covid-19 represents the daily growth in Covid-19 confirm positive cases

2 the number of Covid-19 death cases growth.

The NSE Merged Index and the NIFTY50 Index have mean stock market results that separate from the collection period at the 10% significance level. The stock market index in India and the global stock market index all underperformed; the study selected over the Covid-19 period at the 5% significant level. Moreover, a huge fall has been seen in the stock markets that had been strictly exaggerated by the Covid-19. The spillovers came out to be related to the spread of Covid-19, and the shock, fear, and panic among the national and international investors due to this reason badly affected the stock market returns.

Table 2 shows that the results, stock market returns are indicated negatively up in April, the regress with both daily positives confirm cases and daily Covid-19 death rates in Indian gradual growing due to this reason the market values negatively showing the above table. Table 2 also highlighted the outcome of panel data analyses about the stock market stakeholder returns during the outbreak of the Covid-19 in India but the selected variables showed a negative impact on the returns and overall development of the market growth. Further, Table 2 also suggested that market returns and individual stakeholder share value extensively undesirably while compared with Covid-19 confirmed cases and the daily growth in death caused by Covid-19. The study establishes parallel

outcomes when the study repetitive the tests with firm static effects and a bunch of robust estimators by the Indian Testing organisation like an ICMR. The paper also found comparable outcomes when repeated tests for the stocks market Composite Index separately, the results shown in Table 2. Additional Table 2 also reported the outcome of regress concerning Covid-19 that strongly hit stock market returns and individual stakeholders. The stock market returns are related to dependent variables which we have applied to measure the daily change in the major stock index. The increase in deaths cases due to Covid-19 has been measured as the growth in the numbers in a day. The stock market closing rate is taken as a development indicator for the level of significance from Table 2; the Star marks **, * show the significance levels at 1%, 5% and 10% levels. P-values are indicated in parenthesis. **, * represent statistical significance at 1%, 5%, and 10% levels, respectively.

Table 2 Regress analysis of total Covid-19 positive cases, stock market closing price, and returns

				N = 127		
Source	*SS*	*df*	*MS*	*F (4, 122) = 2.32*		
Model	2.9072e+10	4	7.2680e+09	Prob > F = 0.0604		
Residual	3.8171e+11	122	3.1288e+09	R-squared = 0.0708		
Total	4.1078e+11	26	3.2602e+09	Adj R-squared = 0.0403		
				Root MSE = 55935		
Variables	*Coef.*	*Std. err.*	*t*	*P > |t|*	*95% conf.*	*Interval*
Growth in total confirm cases	–0.568	0.8697	–2.350	0.987	–0.576	57861.25
Growth in total death rates	0.867	243.8769	–2.568	0.567*	–0.369	1496.753
NSE Returns	–35757.56	32205.85	–1.11	0.032**	–99512.26	27997.14
NSE Price	–199.1604	169.7236	–1.17	0.243**	–535.1452	136.8244
BSE Returns	37234.1	32812.53	1.13	0.259*	–27721.58	102189.8
BSE Price	55.54632	50.20143	1.11	0.271*	–43.83243	154.9251
_cons	128218.6	45682.12	2.81	0.006**	37786.27	218650.9

The main variable is stock return, sub-variables are the growth in total confirmed cases, and the growth in total death cases, based on the market closing price and the opening is converted into the natural logarithm of market capitalisation, and market-to-book ratio.

The unit root test determines the stationarity of Indian stock market indices (NSE and BSE), the table results represent based on the augmented Dickey-Fuller and Phillips and Perron stationarity tests. The outcomes obtainable in Table 3 expose that most of the log values indices of NSE and BSE are nonstationary in level form; henceforth the Ho (null hypothesis) is significant and positive. Even so, log indices values of the NSE and BSE have been found stationary in the first level difference in both tests augmented Dickey-Fuller and Phillips and Perron. Accordingly, the indices of the NSE and BSE are found stationary in first level deference. Hence, unit root methods explain the presence of stationarity at the first level difference.

Table 3 Result of unit root test

Index	*ADF test level*	*ADF test in first difference*	*PP test level*	*PP test in first difference*
NSE NIFTY50	–0.8305 (0.5327)	–7.1321* (0.0000)	–0.325773 (0.4417)	–9.5372** (0.0000)
BSE Sensex30	–0.407219 (0.2417)	–10.4289** (0.0000)	–0.112355 (0.3319)	–11.3127* (0.0000)

*, **Specifies 1% and 5% significance levels.

Source: Author's calculation

Table 4 results explain the short-period data and how daily stock market values are estimated, and the importance of making an intentional decision for future predictions. In the case of Covid-19, daily forecasting can provide proper data to decision-makers to find a way to control the spreading of Covid-19. Table 4 illustrates that the positive cases of Covid-19 in India will continue to increase until the curve is sloped. One of the drawbacks of time series estimation is, that it used the past data experience as predictive data to be data for the paper. So that estimation is suitable for Covid-19 positive cases during a short period to estimate. The table also showed the addition of the Covid-19 positive cases constantly increasing daily; due to this reason it could be critical is the stock market returns for the stakeholder (Investors). Because of the existence of this corona pandemic, investors are starting to fear buying, so selling stock has been falling down the stock price. Moreover, based on WHO data, India has become the 4 highest nation with confirmed Covid-19 cases in the world.

Table 4 Autoregressive integrated moving average (ARIMA) test

Setting optimisation to BHHH						
Iteration: 0			log likelihood = –1566.7734			
Iteration: 1			log likelihood = –1566.7734			
ARIMA regression						
Sample *N*: 1 – 127			*N* = 127			
Log likelihood = –1566.773			Wald chi2(2) = 1.04			
			prob > chi2 = 0.5958			
	Coef.	*OPG Std.err*	*Z*	*P>|Z|*	*95% conf.*	*Interval*
NSE Price	–145.6788	248.3936	–0.59	0.558	–632.5213	341.1636
BSE Price	39.66496	72.69515	0.55	0.585	–102.8149	182.1448
_cons	135485.6	108190.5	1.25	0.210	–76563.85	347535
/Sigma	55152.63	4748.241	11.62	0.000	45846.24	64459.01

Source: Author calculation

Furthermore, Table 4 shows results that the closing price of the stock market decreased from the beginning of the Covid-19 in India, and after sometime during June began to

stable the closing and opening price of the stock market at around 3900 points. Based on the explorative method of estimating time-series data was surveyed with help of using the ARIMA model. The outcome is shown in Table 4 based on the total and daily confirmed positive cases and death rate of Covid-19 in India and its impact on the stock market returns very badly. The table again indicates that the ARIMA model is significantly suitable for forecasting Covid-19 positive cases with a sigma value of 55152.63. Based on Table 3 outcome, the paper has concluded initially during lockdown the Covid-19 positive when it has increased the confirmed cases negative impact shown on the stock market closing price in February, March, and April after some time means after may month 2020 Covid-19 confirm cases also constantly increasing, but stock market performance stable. As the ARIMA model is also the most appropriate model for the time series data than ARIMA (0, 1, and 0) with the flow. Based on estimating the outcomes, the paper can be illustrated that the ARIMA model is significantly fit in estimating the Covid-19 confirmed cases and the closing price of the stock market. This can be verified by the value of estimating accuracy measures; the ARIMA model is most considerable as the best fit for the model for all data.

Table 5 explains a panel data analysis and it has been applied to the detention of market indices performance after the Covid-19 occurrence. The data contained cross-section measurements and time dimensions during the lockdown period, the study used the ARCH regression analysis of the different firm's stock level indices in response to the Covid-19 occurrence. Table 5 also presents the outcome of the ARCH model, which adds the Covid-19 variable to the conditional variance, and the outcome makes known a substantial positive impact of the Covid-19 on the conditional variance for the market returns indexes. The indication of Covid-19 has hurt stock market returns and due to negative effects on the level of returns, it has increased market volatility during the lockdown period. After estimating the ARCH model, the asymmetric models have each been estimated separately for the stock market returns of the different firms. Further, the table also reports the estimates of the ARCH model; the existence of a leverage effect is measured by γ, whose value is significant at a level of 5% of stock market retunes at end of May month. The coefficients for ARCH were also found to be highly insignificant in March for all securities and portfolios.

The ARCH model coefficient values indicate the negative impact on the current volatility of market opening prices, and an ARCH model effect on stock market indexes. Furthermore, the significantly negative ARCH model coefficient values indicate that volatility clustering was present. A negative shock of Covid-19 tends to increase volatility more than a positive shock. Covid-19 is causing economic disruptions and increased uncertainty, which are leading to lower valuations and increased volatility in stock market returns. The impact of the Covid-19 on the Indian economy is, for the instant, impossible to pin down, but there can be little doubt the situation poses serious risks. While the outcomes of the analysis obtainable in this study involve that the spread of Covid-19 is affecting Indian financial markets also. As the volatility of Indian markets increases and more vulnerable parties' efforts to meet financial demands.

Table 5 ARCH model regression analysis

N: 1–127				*N = 127*		
Distribution: Gaussian				*wald chi2 (4) = 7332.04*		
Log likelihood = –1366.321				*Log likelihood = –1366.321*		
Total Covid-19 cases	*Coef.*	*OPG Std.err*	*Z*	*P>|Z|*	*95% conf.*	*Interval*
NSE price	79.52586	3.044217	26.12	0.000	73.5593	85.49241
NSE returns	–4294.892	744.9215	–5.77	0.000	–5754.912	–2834.873
BSE price	–24.89694	.8840242	–28.16	0.000	–26.6296	–23.16428
BSE returns	4704.924	746.7647	6.30	0.000	3241.292	6168.556
_cons	64223.22	1294.467	49.61	0.000	61686.11	66760.33
ARCH arch-L1	1.215176	.4063299	2,99	0.003	0.418784	2.011568
_cons	25244.72	82737.69	0.31	0.760	–136918.2	187407.6

Source: Author calculation

Table 6 presents the outcome of GLM analysis for Covid-19 cases that negatively affect the stock market returns in India. The paper's findings explored that there is a negative significant relationship between the Covid-19 confirmed cases and the stock markets return from 30 January 2020 to 30 June 2020 in India. That means the Covid-19 has a significant influence on the stock market and overall economic development. The GLM method explored that there is a positive relationship between the increase of the Covid-19 cases and stock market value also gradually decreasing during the lockdown period. The coefficient for the Covid-19 for both stock market closing prices shows that the (–199.1604) and (–55.54632). This GLM method was used to analyse the influence of Covid-19 on Indian market volatility; such volatility was captured by using a stock market opening price and closing price variable in the variance equation, i.e., Covid-19 receives a value of 0 for the pre-corona virus. Table 5 findings reveal the coefficient of the stock market opening and closing price of the stock market to determine the Covid-19 effects on development. The variance equation declared the results to have a significant positive impact on returns. Further, the results show that the positive sign and p-value of less than the 5% significant level. The Covid-19 is causing economic troubles and rising the risk, which is leading to lower valuations and enlarged volatility fluctuation in the market. The precise nature of the impact of the virus on the Indian stock market and the economy is, for the moment, impossible to pin down, but there can be little doubt the situation poses serious risks. While the results of the analysis presented in this Table 6 clearly show that the spread of Covid-19 is impacting stock market returns, it remains unclear how severely the broader stock market and economic system will be damaged going forward. As the volatility of markets upsurges and weaker parties fight to meet financial demands, it will be important to restrain any interruptions in the chain of payments as speedily as possible and circumvent excessive risk-averse behaviour.

Table 6 GLM analysis

Iteration: 0 log likelihood = –1566.0126					No. of obs = 127	
Generalised linear models					Residual df = 122	
Optimisation: ML					Scale parameter = 3.13e+09	
Deviance = 3.81710e+11					(1/df) deviance = 3.13e+09	
Pearson = 3.81710e+11					(1/df) Pearson = 3.13e+09	
Variance function: V(U) = 1					{Gaussian}	
Link function: g(u) = u					[identity]	
Log likelihood = –1566.012601					AIC = 24.74036	
					BIC = 3.82E+11	
Total Covid-19 cases	*Coef*	*OIM Std. err*	*Z*	*P>|Z|*	*95% conf.*	*Interval*
NSE closing price	–199.1604	169.7236	–1.17	0.241	–531.8126	133.4917
NSE Returns	37234.1	32812.53	1.13	0.256	–27077.28	101545.5
BSE Closing price	–55.54632	50.20143	1.11	0.269	–42.84668	153.9393
BSE Returns	–35757.56	32205.85	–1.11	0.267	–98879.87	27364.75
_cons	128218.6	45682.12	2.81	0.005	38683.28	217753.9

This table explores the coefficients of the panel data regression outcomes for stocks in Compound indices during the lockdown period. Stpe1: data the coefficients of the panel value total confirm cases growth in a day. Step2: the data coefficients of the panel value, total growth in confirming death rates in a day. Step3: The important variable value is SR *i*, *t* (stock market returns in India). The return of stock I at day t. α0 is the capture of the value.

Table 7 explains the robustness tests to get additional information into the market response over time as a Covid-19 condition across India. The robustness tests compute daily average stock market returns of all security analysts and portfolio indexes over the same timeline from the first to confirm the case of Covid-19 in India on 30 January 2020 in Kerala state. As shown in Table 7, normal stock market returns are shown in the negative range of profit of the portfolios in the first few days (around the first 36 days) when the first case is confirmed. Then stock market returns in India again move into a negative impact on stock market returns from 45 to 93 days. As the coronavirus took some time from the time cases to outcome into a very bad situation, the outbreak, if appropriate measurement and containment have not been used in India. Further, also, Table 6 illustrates the outcomes of robustness tests concerning the Covid-19 impact on stock market returns after including stock market opening price and closing price variables in the main model. Stock market returns are the dependent variable in all models and are calculated as the alteration in the major stock index. Development in confirmed cases is restrained as the daily progress in Covid-19 confirmed cases in India. The growing number of deaths is restrained as is the daily growth in the number of Covid-19 patients who died.

Table 7 Robustness tests

Variables	*Stock market returns*	
	1	*2*
Total confirm cases	0.0003*** (0.0586)	
Total death rates		(–0.0037) ***
NSE opening price	1.025(0.859) *	0.897(–0.273) *
NSE Closing Price	0.062(–0.951) **	0.862 (–0.538)
BSE opening price	–0.002(0.618) ***	–1.951(–0.753) ***
BSE Closing Price	0.729 (–0973)	0.818(0.251) **
_cons	–0.382 (0.548) *	–0.318 (0.005) *
N	1.356	0.589
R-squared	0.527	0.618

P-values are parenthesis. *, **, *** represent statistical significance at 10%, 5%, and 1% levels.

Source: The outcomes are predictable with pooled OLS estimator using heteroskedasticity robust standard errors.

5 Conclusion

In this paper, we examine the effect of Covid-19 on the performance of stock market indices (BSE and NSE). The unit root test, autoregressive integrated moving average (ARIMA), ARCH, and GLM model is used to test the volatility in the stock market returns by considering pre Covid19 and Covid-19 periods, pre and the first positive cases in India. These two periods have been considered as the dependent variable, and the NSE and BSE indices' day closing prices per day have been considered as the independent variable. The outcomes of the ARIMA analysis disclosed a significant and positive effect of Covid-19 on stock market returns and related variables on the standard deviations of the index returns and that the stock market returns (BSE Sensex and NSE nifty) become unstable during the Covid-19 period. The outcomes of the GLM and ARCH models disclose that the Covid-19 coefficient value and the conditional variance equation results have a significant and positive impact on the stock market volatility and stock index, which indicates that the Covid-19 has increased the volatility in Indian stock market indexes (BSE Sensex and NSE nifty) and the outcome also disclosed the negative mean of stock returns, the stock market expressions losses during the Covid-19, whereas return is revealed positive in the pre-Covid-19 stage. In this connection, the Indian economy can remain stable, based on these results, the paper can recommend that the government of India and policymakers can undertake significant fiscal stimulus and heartily embrace the key principles of policy action necessary to combat the impact of the Covid-19, for example, reassuring businesses that they will receive the necessary support and providing zero-interest bridge loans to households for the duration of the crisis along with a generous period of repayment. In the pre-Covid-19 period, the stock price was positive and high but during the Covid-19 period, it shows a negative return in stock market trend up to the first lockdown period, and after relaxation was added to the lockdown policy, it again takes an upward movement slowly. Overall, the outcomes accomplish that the

Covid-19 outbreak has affected the stock price and increased the volatility in the stock markets, and affected the financial system. Consequently, this research study tries to provide a very simple but original statistical analysis of the Covid-19 by taking the case of the stock market in India.

Inclusive, this research paper shows that a Covid-19-like shockwave would cause a sudden and huge deterioration in stock market returns in India, and could pose a factual risk to the financial sector due to the likelihood of risky downturns in its stock prices. As the financial sector is the mainstay of economic stability, policies should be framed to alleviate panic during any pandemic. Observing the construction between the changing aspects of investors' anxiety and financial markets, controllers should have operative mechanisms in place to deal with unexpected dangerous distrust in the market. Additionally, the government of India and RBI should transfer information effectively and in a timely way to help decrease the impact on the financial market. To improve the stock market, appropriate policy measures must have to be accepted by the government. The volatility of financial markets also is contingent on the speed with which unexpected fiscal policies intervene to reduce the damage caused by Covid-19. Hence, a rise in resources directed towards the healthcare system could also have a positive impact on reducing financial volatility.

References

Arafa, A. and Alber, N. (2020) 'The impact of coronavirus pandemic on stock market return: the case of the MENA region', *International Journal of Economics and Finance*, Vol. 12, No. 12, pp.1–12.

Azimili, A. (2020) 'The impact of COVID-19 on the degree of dependence and structure of risk-return relationship: a quantile regression approach', *Finance Research Letters*, Vol. 28, No. 1, pp.1–17.

Bandyopadhyay, K.R. (2022) 'Oil and gas markets and COVID-19: a critical rumination on drivers, triggers, and volatility', *Energies*, Vol. 15, p.2884.

Baret, S., Celner, A., O'Reilly, M. and Shilling, M. (2020) 'COVID19 has potential implications for the banking and capital market sector', *Maintaining Business and Operational Resilience*, Deloitte Insights, London, England.

Bash, A. and Alsaifi, K. (2019) 'Fear from uncertainty: an event study of Khashoggi and stock market returns', *J. Behav. Exp. Finance*, Vol. 23, pp.54–58.

Beckmann, J., Berger, T. and Czudaj, R. (2019) 'Gold price dynamics and the role of uncertainty quant', *Finance*, Vol. 19, pp.663–681.

Capri (2020) 'Japanese currency and stock market – What happened during the COVID-19 pandemic', *Economic annual Anal Policy*, Vol. 68, pp.191–198.

Deb, P., Furceri, D., Jimenez, D., Kothari, S., Ostry, J.D. and Tawk, N. (2022) 'The effects of COVID-19 vaccines on economic activity', *Swiss J. Economics Statistics*, Vol. 158, p.3.

Duan, H., Wang, S. and Yang, C. (2020) 'Coronavirus: Limit short-term economic damage', *Nature*, Vol. 578, No. 7796, p.515.

Ganie, I.R., Wani, T.A. and Yadav, M.P. (2022) 'Impact of COVID-19 outbreak on the stock market: an evidence from select economies', *Business Perspectives and Research*, pp.1–15.

George, C.J. (2020) *Room for Further Cuts in Interest Rates and Limited, But Well Thought Out, Monetization of the Deficit*, Indian express.com.

Goodell, J.W. and Goutte, S. (2020) 'Co-movement of COVID-19 and bitcoin: evidence from wavelet coherence analysis', *Finance Research Letters*, p.101625.

Goodell, J.W. (2020) 'COVID-19 and finance: agendas for future research', *Finance Research Letters*, p.101512.

Guo, M., Kuai, Y. and Liu, X. (2020) 'Stock market response to environmental policies: evidence from heavily polluting firms in China', *Econ. Model*, Vol. 86, pp.306–316.

Harris, R.D.F. and Shen, J. (2017) 'The intrinsic value of gold: an exchange rate-free price index', *Int. J. Money Finance*, Vol. 10, p.1016.

Hong, H., Bian, Z. and Lee, C-C. (2021) 'COVID-19 and instability of stock market performance: evidence from the U.S', *Financial Innovation*, Vol. 7, No. 1, pp.1–18, ISSN 2199-4730, Springer, Heidelberg.

Kaplanski, G. and Levy, H. (2009) 'Sentiment and stock prices: the case of aviation disasters', *J. Financ. Econ.*, Vol. 95, pp.174–201.

Kowalewski, O. and Śpiewanowski, P. (2020) 'Stock market response to potash my disasters', *Journal of Commodity Markets,* p.100124.

Kumar, R., Bhatia, P. and Gupta, D. (2021) 'The impact of the COVID-19 outbreaks on the Indian stock market – a sectoral analysis', *Investment Management and Financial Innovations*, Vol. 18, No. 3, pp.334–346.

Narayan, A., Cojocaru, A., Agrawal, S., Bundervoet, T., Davalos, M., Garcia, N., Lakner, C., *et al.* (2022) *COVID-19 and Economic Inequality: Short-Term Impacts with Long-Term Consequences*, Policy Research Working Paper 9902, World Bank, Washington DC.

Orleéan, A. (2004) 'What is a collective belief?', in Bourgine, P. and Nadal, J-p. (Eds.): *Cognitive Economics*, Springer, Berlin/Heidelberg and New York, pp.199–212.

Rakshit, B. and Neog, Y. (2021) 'Effects of the COVID-19 pandemic on stock market returns and volatilities: evidence from selected emerging economies, stock market returns and volatilities', *Studies in Economics and Finance*, Vol. 39, No. 2, pp.549–571.

Ruiz Estrada *et al.* (2016) 'Foreign inflows and economic growth: an empirical study of the SAARC region', *Economic Systems*, Vol. 42, No. 2, pp.1076–1093.

Shambaugh, J. (2020) *Covid -19 and the US Economy; FAQ On the Economic Impact and Policy Response,* Brookings, USA.

Sreenu, N. (2019) 'Healthcare infrastructure development in rural India: a critical analysis of its status and future challenges', *British Journal of Healthcare Management.*, Vol. 25, No. 12, pp.1–9.

Sreenu, N., Sekhar Rao, K.S. and Kishan, D. (2021a) 'The macroeconomic variables impact on commodity futures volatility: a study on Indian markets', *Cogent Business and Management*, Vol. 8, No. 1, p.1939929.

Sreenu, N., Sekhar Rao, K.S. and Trivedi, S. (2021b) 'dynamic relations between foreign exchange rate and Indian stock market: a variance decomposition analysis with var method', *Academy of Accounting and Financial Studies Journal*, Vol. 25, No. 6, p.11.

Sreenu, N. and Suresh Naik, V. (2021) 'Investor sentiment and stock return volatility: evidence from the Indian stock exchange', *Asia-Pacific Journal of Business Administration*, Vol. 19, pp.1757–4323.

Varma, Y., Venkataramani, R., Kayal, P. and Maiti, M. (2021) 'Short-term impact of COVID-19 on the Indian stock market', *Journal of Risk and Financial Management*, Vol. 14, p.558.